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Work(dis)place: the role of the changing work environment in the context of remote work

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Introduction

In the latter part of 2019 and early 2020, the global landscape witnessed significant disruptions due to the onset of the Covid-19 pandemic. The proliferation of the virus and ensuing lockdown measures precipitated substantial shifts in societal norms and interpersonal dynamics, leading to a pervasive sense of social isolation. These transformations also profoundly influenced the global production and labor sector, resulting in a notable surge in remote work practices. The terms "remote working", "e-working", and "smart working" are employed, often interchangeably, to denote work activities that can be flexibly carried out regardless of time or location, characterized by extensive utilization of technology to facilitate adaptable work approaches (Grant et al., 2013).

According to Eurostat data (2022), the proportion of Eurozone workers habitually or occasionally engaging in remote work in 2021 stood at 24%, a marked increase from 14% in 2019. In the case of Italy, severely impacted by the early stages of the Covid-19 pandemic, the crisis inevitably accelerated the emergence and widespread adoption of remote or hybrid work arrangements. While 87.6% of workers reported no prior experience with remote work before the pandemic (INPS, 2021), data from the *Osservatorio per lo Smart Working* of the Politecnico di Milano (2022) indicates that during the peak phases of the crisis, this modality of work involved approximately 5.47 million workers, constituting 33% of the national workforce. This figure decreased to 4 million in 2021 and stabilized at 3.6 million in 2022. Large organizations predominantly implemented these arrangements, with an average of 9.5 monthly remote workdays. Despite the expanding scientific literature on remote work, the existing findings give rise to what has been termed the "paradox of mutually incompatible consequences" for remote employees (Gajendran & Harrison, 2007, p. 1526). This paradox arises from the often-conflicting outcomes observed in remote work research.

Consequently, before ascertaining whether remote work has become the "New Normal" in the labor landscape, it is imperative to understand which configurations yield tangible positive effects on both the worker and the organization. While certain studies suggest that remote work, characterized by heightened work autonomy (Maruyama & Tietze, 2012; Müller & Niessen, 2019), is associated with reduced stress (e.g., Kröll et al., 2017; Delanoëje & Verbruggen, 2020), increased work engagement (e.g., Mäkikangas et al., 2022; Masuda et al., 2017), and sustained organizational commitment (e.g., Choi, 2019; Harker et al., 2012; Kelliher & Anderson, 2010), other research has yielded non-significant or opposing results (e.g., Henke et al., 2016; Kröll et al., 2017; Mann & Holdsworth, 2003; Sardeshmukh et al., 2012). Moreover, a pivotal question concerning this work mode pertains to its efficacy regarding remote worker productivity. According to a recent systematic review by Mutiganda and colleagues (2022), certain studies indicate a positive correlation between remote work and job

performance (e.g., Golden & Gajendran, 2018; Narayanamurthy & Tortorella, 2021; Tsukamoto, 2021), while in others this relationship was not found as statistically significant (e.g., Aguilera et al., 2016; Bao et al., 2022; Hyland et al., 2005).

In the wake of the Covid-19 pandemic and the subsequent surge in remote work, the scientific discourse addressing the implications for employment and organizations has expanded. Nevertheless, a notable dearth of research examining novel work environments remains. While remote work affords individuals autonomy in choosing their workspace, it has often led to a merging of domestic and professional spheres. Swift governmental responses to the pandemic and ensuing lockdowns compelled many workers to adapt makeshift home workspaces (Franken et al., 2021; McAllister et al., 2022). A primary consequence of this convergence between home and work settings is the dissolution of both physical and conceptual boundaries that traditionally separated family life from work life (Mann et al., 2000; Russell et al., 2009). Home environments may frequently prove unsuitable or inadequate for a dedicated space for professional tasks, such as the bedroom or kitchen. According to Adisa and colleagues (2021), remote workers compelled to share their workspace with other family members or roommates reported more frequent declines in well-being, engagement, and productivity. Given that remote work grants greater autonomy and flexibility in choosing a workspace (Gajendran & Harrison, 2007; Maruyama & Tietze, 2012), the domestic setting and its physical-spatial attributes assume crucial significance in investigating the nexus between remote work and occupational well-being. Existing literature furnishes ample evidence on how the home environment can positively impact residents' well-being (for an overview, see Emami & Sadeghlou, 2021).

This is particularly critical due to the symbolic import attributed to the home.

Drawing from Rowles and Bernard's (2013) conceptualization, the dwelling encompasses the tangible and material facets, whereas the home encompasses the environment imbued with the symbolic and identity-laden meanings derived from memories and experiences within that space.

This dimension gains added importance when a second layer of identity is superimposed by overlapping between the home and work environments.

This dissertation wants to answer these general questions: how has this overlap changed the affective attachment bond that the individual (or, in this more specific case, the worker) creates with their place? And then, how can the physical characteristics of the home environment dedicated to remote work activity contribute to satisfying some basic needs and occupational well-being?

Specifically, this Thesis work has a twofold objective:

Objective 1: To help fill the gap in the literature about the impact of spatial-physical elements on occupational well-being in the context of remote work.

Objective 2: To enrich the literature and the theoretical perspectives on the antecedents and consequences of place attachment.

Specifically, the following Thesis is divided into six chapters, briefly outlined below.

Chapter 1. In the first chapter, a theoretical excursion of the three main variables implemented in the research is presented. The first section presents a review of the literature pertaining to the relationship between the individual and environments, framed through the Person-Environment Fit (P-E) Theory (Caplan, 1983; 1987), with a particular focus on work environments and the principal Indoor Environmental Quality (IEQs) responsible in promoting occupational well-being. In the second section, an analysis of the main theoretical perspectives in the study of place attachment, its antecedents, and consequences on well-being is presented. Finally, in the third paragraph, an in-depth review of Self-Determination Theory (SDT; Ryan & Deci, 2000), its applications in organizational contexts, and the relationship between the needs for autonomy, competence, and relatedness in the development of place attachment is presented.

Chapter 2. In the second chapter, the first study is presented. Study 1 aims to create a first version of an instrument to assess the subjective perception of physical-spatial and comfort qualities in the domestic environment dedicated to remote work activity. The tool takes cues from similar instruments applied to different contexts, such as neighborhoods (e.g., Bonaiuto et al., 2003, 2006; Fornara et al., 2010) and hospitals (e.g., Andrade et al., 2012; Fornara et al., 2006). Through an Exploratory Factor Analysis (EFA), the first version of the factor structure of the Perceived Remote Working Environment Quality Indicators (PRWEQIs) will be analyzed.

Chapter 3. In the third chapter, the second study is presented. Through a Confirmatory Factor Analysis (CFA), the study aims to confirm the factorial structure of the Perceived Remote Working Environment Quality Indicators (PRWEQIs) that emerged in Study 1 on a sample of remote workers. Gender-based invariance will be verified using Multi-group Confirmatory Factor Analysis (MGCFA), to test the instrument's properties and statistical robustness. In addition, the effects of PRWEQIs on some indicators of occupational well-being are presented. Chapters 2 and 3 of this dissertation contribute to the first research objective, developing an indicator for studying environmental comfort in the remote work context by analyzing its effect on occupational well-being.

Chapter 4. In the fourth chapter, the third study, which includes two sub-studies, is presented, with two sub-studies aimed at expanding the scientific literature concerning attachment. In particular, the relationship between perceived comfort, autonomy, competence, and relationship needs identified by Self-Determination Theory (SDT; Ryan & Deci, 2000) and workplace attachment is analyzed. Specifically, the relationships between variables are analyzed in Study 3a, which is a correlational study. Study 3b implemented an experimental procedure to confirm causal relationships between Study 3a's variables.

Chapter 5. The fourth study is presented in the fifth chapter. Study 4 is correlational and aims to apply the results of previous studies to analyze the relationship between environmental comfort, place attachment, basic psychological work needs, and work engagement. In this way, Chapters 4 and 5 of this dissertation provide new insights into the literature on workplace attachment, identifying its antecedents and outcomes and extending its analysis to the context of remote work.

Chapter 6. The last chapter provides a brief overview of the main results obtained by the research project, emphasizing theoretical and practical implications, limitations, and potential future directions.

Chapter 1

Literature overview

1.1. Perceived environmental comfort and well-being

Since the dawn of human history, individuals have needed to locate, inhabit, and operate in supportive environments. According to the Person-Environment Fit (P-E) Theory, people look for domains that match their needs and characteristics to fit environments (Caplan, 1983; 1987). In circumstances of non-adaptation or misfit, the person may feel stressed, anxious, and frustrated and may be motivated to change something about himself or the circumstance to regain fit with the environment (Bäcklander & Richter, 2022; Williamson & Perumal, 2021).

Throughout the history of Environmental Psychology, there has been a sustained interest in understanding how individuals engage with various environments and contexts in their lives.

This encompasses environments ranging from natural settings to constructed urban areas, including homes (e.g., Bagais & Pati, 2023; Fornara et al., 2021), neighborhoods (e.g., Ayalon, 2023; Rollings et al., 2017), schools (e.g., Evans et al., 2010; Maxwell, 2016), stores (Doucè et al., 2014; Schertz et al., 2022), and museums (e.g., Mastandrea et al., 2021; Wineman & Peponis, 2009).

In examining the relationship between individuals and their environments, it becomes crucial to distinguish between two key constructs.

"Environmental satisfaction" pertains to the subjective evaluation of how well a particular environment aligns with an individual's expectations and needs and to what extent it is positively valued (Bonaiuto & Alves, 2012). This assessment is heavily influenced by the individual's experiences, needs, and expectations (Elder et al., 2003).

In contrast to satisfaction, which involves higher levels of cognitive engagement, memory retention, and evaluative processes based on individual value systems and the intended function of spaces, the concept of "comfort" has primarily been employed in environmental design research to investigate the physical and physiological sensations, as well as the perception of specific environmental stimuli originating from the immediate surroundings (Shin, 2016). Consequently, assessing comfort entails objectively measuring environmental elements to the extent possible by experts (Bonnes & Bonaiuto, 1995). However, objective assessment may be unattainable in certain environmental or social contexts. In such cases, employing "*naïve*" or Observed-Based Environmental Assessments (Gifford, 2002) is necessarily based on perceptual-assessment data gathered from individuals who observe or utilize the environment. These assessments enable the evaluation of specific aspects of environmental

quality from an observed-based perspective, leading to the generation of Perceived Environmental Quality Indices (PEQIs), such as those developed for the assessment of residential (PREQIs; Bonaiuto et al., 1999, 2003, 2006; Fornara et al., 2010) and hospital (PHEQIs; Andrade et al., 2012; Fornara et al., 2006) environments and, as well, more recently, prison too (Alves et al., 2024).

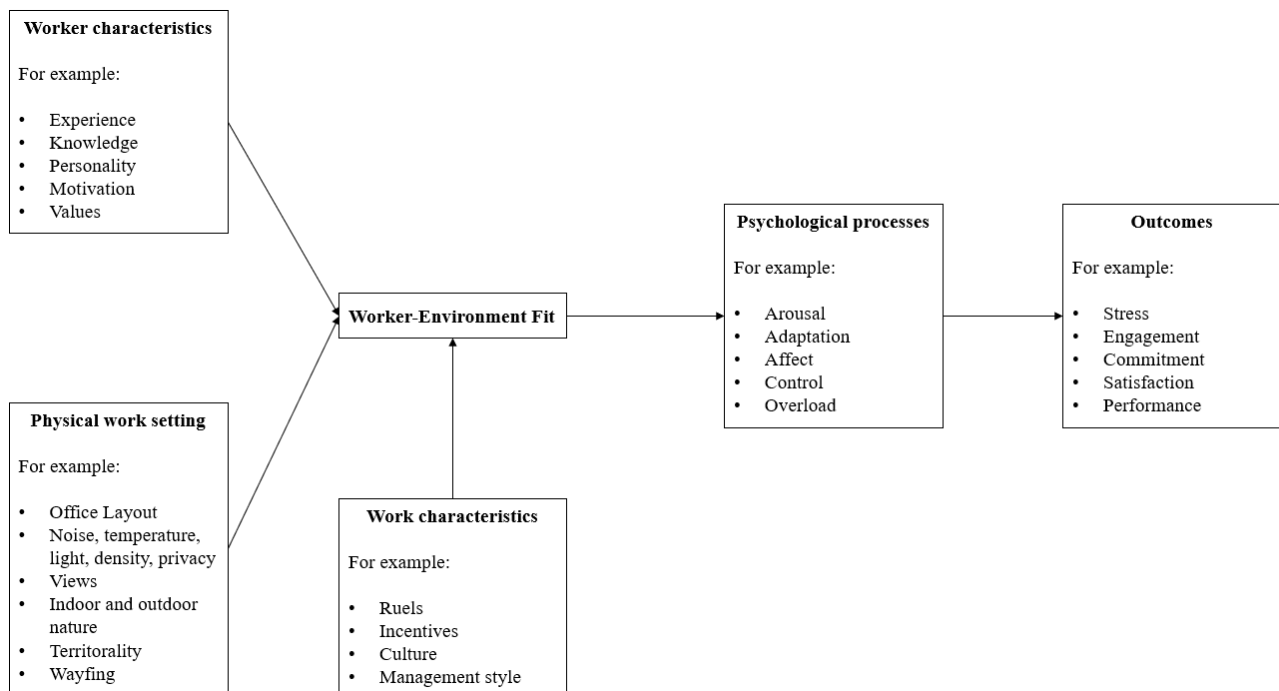
Among the various contexts of daily life, Environmental Psychology has long been interested in work environments, recognizing their profound influence on individuals' well-being and behavior (McCoy, 2002). Regarding the Person-Environment fit in the organizational context, this can cover several areas, such as the person-vocation fit, the person-work fit, the person-organization fit, as well as that relating to the physical-spatial environment in which the worker is to perform his or her daily work activities (for a review, see Van Vianen, 2018).

The concept of worker-environment fit is well described by the Psychological-Environmental Model proposed by Gifford (2002), in which three elements concur in determining the congruence between the worker and the work environment (see Figure 1). The first component relates to job characteristics and work policies, norms, incentives, managerial styles, and organizational culture; the second component relates to worker characteristics, personality, motivations, experiences, knowledge, and personal values. The third component concerns the distinctive physical characteristics of the work environment. These constituents of the workplace can be encapsulated within the construct of Indoor Environmental Quality (IEQs).

IEQs encompasses the interplay of physical, chemical, and biological elements within indoor settings, including factors like air composition, thermal conditions, humidity levels, luminance, and acoustic levels and their consequential impact on the overall quality of life (Steinemann et al., 2017). Following the Job Demands-Resources (JD-R; Demerouti et al., 2001) model, IEQs can either be a resource in promoting well-being or, in particular configurations, they may constitute environmental demands and stressors that can undermine occupational performance and well-being (Fisk, 2000; Kallio et al., 2015). The tangible aspects of a work setting can be regarded as valuable resources for the job when they actively contribute to achieving work-related aims and/or supporting individual growth and aspirations (Bakker & Xanthopoulou, 2013). Providing a work environment tailored to employees' needs and preferences enhances their occupational well-being and confers a competitive edge to the entire organization (e.g., Scrima et al., 2022; Zhenjing et al., 2022). Throughout history, one of the initial focal points has been the arrangement of office spaces. The layout and organization of offices serve as the foremost tangible representation of an organization's culture (Kallio et al., 2015), explicitly conveying how work processes are structured and delineating the relationship between the worker and the organization. Depending on the organizational and operational structure, it is possible to categorize offices into four types (Duffy et al., 2003): hive, cell, den, and club,

determined by the interplay of private spaces (such as individual workstations) and open-plan areas (where there are more than five workstations). Numerous studies have demonstrated that the configuration of open-plan offices is linked to reduced privacy and increased levels of distraction (Danielsson & Bodin, 2009; Frontczak et al., 2012; Haapakangas et al., 2018; Kaarlela-Tuomaala et al., 2009; Kim & de Dear, 2013), diminished satisfaction (De Croon et al., 2005; Hongisto et al., 2016; Oldham, 1988; Sundstrom et al., 1982), and lower levels of job performance (Al Horr et al., 2016; Brennan et al., 2002; De Croon et al., 2005; Seddigh et al., 2014; Sundstrom et al., 1982).

Figure 1 – *Psychological-environmental model (adapted from Gifford, 2002).*



More recently, there has been a growing focus on examining activity-based workplaces (ABWs), a spatial arrangement devoid of designated workstations that allows employees to move flexibly between different areas on the basis of the specific task at hand. However, findings in this area remain diverse and conflicting (Bhave et al., 2020). Although these specific configurations have frequently demonstrated superiority over traditional open-plan offices (e.g., Jahncke & Hallman, 2020; Kim et al., 2016), adverse or inconclusive outcomes arise when compared to private offices (e.g., Haapakangas et al., 2019; Halldorsson et al., 2021; Hoendervanger et al., 2016). Other IEQs encompass a multifaceted range of parameters that shape occupants' psychological and physiological well-being. The interplay of factors such as temperature, relative humidity, and ventilation is critical in establishing a favorable working environment. Optimal thermal conditions, generally maintained in the range of 20°C to 24°C, facilitate physical comfort and significantly influence cognitive

functioning and overall work performance. In addition, relative humidity levels between 30-60% play a key role in mitigating the discomfort associated with too-dry or too-humid conditions, thus contributing to occupant well-being. Adequate ventilation, on the other hand, is a central pivot in ensuring a continuous supply of fresh air, effectively diluting indoor pollutants and creating an atmosphere conducive to cognitive functioning and respiratory health. Finally, adequate lighting levels, both natural and artificial, prevent visual fatigue and promote a stimulating and productive work environment (for a review, see Al Horr, 2016; Radun & Hongisto, 2023). An escalating focus is directed towards the integration of natural elements both within and around the workplace, attributed to their capacity to restore cognitive vigor and alleviate stress (Kaplan, 1995; Ulrich, 1983), enabling individuals to effectively manage various job-related pressures (e.g., Bringslimark et al., 2011; Hartig et al., 2011). Workplaces incorporating natural elements and adhering to biophilic design principles (Browning et al., 2014) have demonstrated potential in diminishing occupational stress (e.g., Aries et al., 2010), mitigating fatigue (e.g., Aristizabal et al., 2021), and alleviating anxiety (e.g., Chang & Chen, 2005), thereby fostering performance (e.g., Aristizabal et al., 2021) and bolstering job satisfaction (e.g., An et al., 2016; Bellini et al., 2015; van Esch et al., 2019).

Although the literature has provided numerous evidence about the impact of various IEQs on classical work environments (i.e., offices inside organizational buildings), little research has focused on the relationship between physical elements and occupational well-being in remote work. These elements become especially important since, in most cases, the use of remote working has forced an adaptation of the home environment to a work environment. In many instances, remote work, while affording individuals the freedom to choose their work location, has led to a convergence of home and work settings. The swift governmental response to the COVID-19 crisis and ensuing lockdowns compelled numerous workers to create makeshift workspaces within their homes (Franken et al., 2021; McAllister et al., 2022). A significant outcome of this overlap between work and home environments is the dissolution of the traditional boundaries that once separated family life from professional life (Mann et al., 2000; Russell et al., 2009). Frequently, home spaces may be ill-suited or inappropriate for fulfilling their intended functions, such as using the bedroom or kitchen for work-related tasks. Adisa and colleagues (2021) noted that remote workers who were compelled to share their workspace with family members or roommates reported more frequent declines in well-being, engagement, and productivity. Since remote work permits greater autonomy and flexibility in choosing a workspace (Gajendran & Harrison, 2007; Maruyama & Tietze, 2012), the characteristics of the domestic environment, particularly in terms of physical layout and spatial arrangement, assume paramount importance in examining the nexus between remote work and professional well-being.

The existing body of literature offers substantial evidence regarding the positive impact of the home environment on the well-being of occupants (e.g., Emami & Sadeghlou, 2021).

This is of particular significance due to the symbolic value attributed to the home concept.

Following Rowles and Bernard's (2013) characterization, the dwelling embodies the tangible, material aspects, while the home encompasses the environment enriched with symbolic and identity-related meanings stemming from memories and experiences within that space. This dimension gains further importance when an additional identity layer is introduced, arising from the convergence of the home and work environments. Research conducted by Müller and colleagues (2022) demonstrated that an appropriate workspace, characterized by a tranquil, distraction-free setting equipped with all necessary materials and tools, positively influences the performance of remote workers. Recent investigations in South Korea also delved into acoustic well-being in home-based work settings, revealing that annoyance from household noise (e.g., noise from other occupants or appliances) was associated with diminished job satisfaction and performance (Park et al., 2023). Preliminary findings suggest that factors like temperature (Kawakubo & Arata, 2022), room size (Moos & Skaburskis, 2008), and the provision of dedicated rooms and workstations which are separate from the rest of the home environment (Awada et al., 2021; Xiao et al., 2021) exert a positive influence on both performance and well-being by minimizing discomfort-related symptoms. More recently, Bergefurt and colleagues (2022) scrutinized the impact of various Indoor Environmental Quality (IEQ), extensively studied in the literature on workplace environments (Kallio et al., 2020), on mental health during the COVID-19 pandemic. While variables like temperature, sound, ventilation, and air quality showed fewer substantial associations with mental health, factors such as daylight, outdoor views, artificial lighting, privacy, and greenery in the home office were positively linked to well-being indicators and concentration levels, while negatively correlated with stress and arousal. Notably, the perception of a private and uninterrupted remote work environment was connected to enhanced online interactions with colleagues and increased focus on work-related tasks.

1.2. From interpersonal attachment to workplace attachment

The concept of place has long been recognized as a fundamental element in human experience, shaping and influencing many social interactions and psychological processes. From the perspective of the Person-Environment (P-E) Fit Theory (Caplan, 1983, 1987), the importance of the relationship between individuals and different contexts becomes clear: places serve as the backdrop against which our lives unfold, and they hold a profound significance in the development and maintenance of social relationships. Over the past 30 years, place attachment has been one of the most studied constructs concerning the relationship between the physical environment and the individual, attracting researchers' attention in various human sciences, including psychology, geography, urbanism, sociology, and architecture (Lewicka, 2010).

Although there is no clear and unambiguous definition of place attachment (Lewicka, 2011; Scannell & Gifford, 2010), most researchers agree in identifying it with the affective bond that an individual creates with a meaningful place and which, in addition to the affective component, includes cognitive and behavioral components (e.g., Giuliani, 2003; Low & Altman, 1992). Starting from this definition, a place can become an object of attachment, consistent with and analogous to what interpersonal attachment theories describe (i.e., Ainsworth, 1979; Bowlby, 1969). According to Bowlby (1969), an inherent, biologically driven imperative directs the pursuit and maintenance of a physical and emotional connection with a primary attachment figure, typically the maternal figure, in the early stages of development. This pursuit of proximity serves as a survival strategy, as the attachment figure establishes a secure base, or a "safe haven", where the child experiences a sense of safety and stability. This places attachment mechanism mirrors the process observed when individuals attach to other persons. Drawing from their experiences, motivations, and objectives, individuals are predisposed to seek proximity to meaningful and secure environments, akin to safe havens, to alleviate uncertainty and obtain emotional relief (Korpela et al., 2002).

Over the past five decades, various viewpoints have emerged, often drawing on classical attachment theory, seeking to elucidate the connection between individuals and their meaningful places. Notwithstanding its parallels with classical attachment theorists, Lewicka (2011) delineated the various perspectives that had hitherto characterized the study of place attachment as sluggish, conceptually nebulous, stagnant, bereft of theoretical underpinnings, and exhibiting limited empirical advancements. The primary challenge in place attachment research arises from the abundance of varied definitions and viewpoints, frequently originating from disparate academic disciplines. This dilemma prompted Giuliani and Feldman (1993) to assert that "the foremost task for researchers in this domain of investigation is to amalgamate divergent perspectives and methodologies" (p. 271).

According to the taxonomy proposed by Hernández and colleagues (2021), three overarching perspectives emerge when examining place attachment. Some scholars (e.g., Giuliani, 2003; Rollero & De Piccoli, 2010a) posit place attachment as a unidimensional construct primarily rooted in emotional connection to a place, distinct from and independent of identity and place dependence constructs. Conversely, others conceptualize it as a multidimensional construct; for instance, Williams and Vaske (2003) consider place attachment as a second-order factor summarizing place identity and dependence. From this viewpoint, place attachment emerges when the place integrates into an individual's social identity and fulfills her/his needs. Lastly, a third perspective holds that place attachment constitutes an underlying dimension of a broader construct. For example, Jorgensen and Stedman (2001, 2006) consider the “sense of place” as an individual's attitude towards a place, adhering to the tripartite model of attitudes (Rosenberg & Hovland, 1960), encompassing an affective component (i.e., place attachment), a cognitive component (i.e., place identity), and a behavioral component (i.e., place dependence).

Scannell and Gifford (2010) introduced a three-dimensional model of place attachment known as the Person-Process-Place (PPP) framework to synthesize and integrate these viewpoints. According to the authors, place attachment is “a bond between an individual or group and a place that can vary in terms of spatial level, degree of specificity, and social or physical features of the place, and is manifested through affective, cognitive, and behavioral psychological processes” (*ibidem*, p. 5). The framework posits that place attachment is a multidimensional construct characterized by person-related factors, psychological processes, and distinct attributes of the place itself. The first dimension of place attachment is the person, the actor who becomes attached to the place.

At the personal level, attachment occurs both at the individual level, based on subjective memories and experiences, and at the social and group level, when a place, such as occurs with places of worship, becomes a symbolic representation of the thoughts, values, and norms of the social group (Low, 1992).

The second dimension of place attachment, the psychological one, partly echoes the sense-of-place perspective (Jorgensen & Stedman, 2001), being characterized by: i) an affective component, i.e., the feelings and emotions arising from the individual-place connection (Manzo, 2003; 2005); ii) a cognitive component, i.e., the set of evaluations and characteristics that are considered important in the place and that make it an integral part of the subject's identity system (e.g., Proshansky, 1978), thus developing a sense of belonging to the place (Giuliani, 2003); and iii) a behavioral dimension, i.e., analogously to the interpersonal attachment, which means the search for a contact of proximities with the places to which one is attached (Hidalgo & Hernández, 2001).

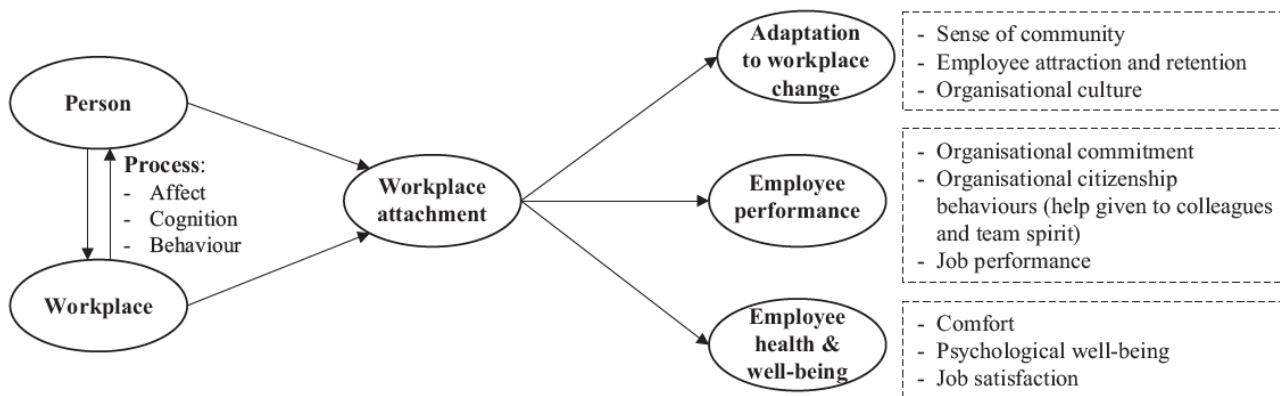
Finally, the third dimension of place attachment is characterized by the place itself, its social characteristics (i.e., how much it facilitates the establishment and maintenance of social relationships within it), and physical characteristics (i.e., the spatial and aesthetic features that can influence these interactions) (Fried, 2000; Riger & Lavrakas, 1981).

According to the meaning-mediated model of place attachment proposed by Stedman (2003), individuals do not primarily develop direct emotional bonds with the physical attributes of a place. Instead, their attachment is influenced by the symbolic significance attributed to those features. This perspective suggests that the connections people feel towards a particular location are deeply rooted in the meanings, narratives, and cultural values associated with it. Expanding on this theory, it implies that place attachment is not solely based on its tangible characteristics, such as architecture, landscape, or infrastructure. Rather, it is the subjective interpretations and personal experiences that individuals attach to these physical elements that shape their sense of belonging and connection. Furthermore, the meaning-mediated model acknowledges that these attachments are not static; rather they can change over time as the relevant place's experiences and interpretations evolve.

Over the years, many scholars have applied the study of place attachments and its consequences to different contexts, such as the home and residential environments (e.g., Anton & Lawrence, 2014; Bonaiuto et al., 1999; Bonaiuto et al., 2006; Bonaiuto & Alves, 2012; Lewicka; 2010; Rollero & De Piccoli, 2010), natural places (e.g., Colley & Craig, 2019; Landon et al., 2021) and different populations, such as children (e.g., De Dominicis et al., 2017; Jack, 2010; Scannell et al., 2016), elderly (e.g., Fornara et al., 2019; Fornara & Manca, 2017) or victims of environmental or social disasters and forced to leave the place of attachment (e.g., Albers et al., 2021; Ariccio et al., 2020, 2021; Sampson & Gifford, 2010). In recent years, more and more attention has been given to work environments and the potential positive effects of workplace attachment on occupational well-being. Following the PPP model, the three facets of place attachment can also be identified within the work context (see Figure 2). The personal dimension encompasses both the individual aspect, represented by the workers with their memories, experiences, and professional objectives, and the collective aspect, characterized by the symbolic significance ascribed to the workplace and shared among members of the organization (Ardalan, 2019).

As for the psychological element, attachment to the workplace entails the emotions (i.e., affect), assessments (i.e., cognition), and behaviors exhibited by individual workers and work groups to cultivate a close, valued, and territorial connection with the work environment. Lastly, the place-related dimension encompasses the physical-spatial and social features that serve as indicators of the organizational culture (Schein, 1990).

Figure 2 – PPP framework of workplace attachment: person, process, place, and desired outcomes.



Note. Retrieved from Inalhan, Yang, and Weber (2021).

The physical-spatial aspect of the work environment serves a triple purpose: firstly, an instrumental one, which pertains to the suitability of the environment in terms of function and ergonomics for its occupants; secondly, a symbolic function, where the environment's characteristics can communicate a sense of group, social identity, and dedication to the organization; and lastly, an aesthetic function, involving the degree of pleasantness and enjoyment that an individual experiences in her/his physical work surroundings (Vilnai-Yavetz et al., 2005; Rafaeli & Vilnai-Yavetz, 2004).

Fostering a work environment centered around employees' well-being and satisfaction and cultivating a strong attachment to the workplace can thus emerge as a strategic advantage for the organization. This approach encourages employee retention and contributes to the establishment of more conducive conditions for overall work-related well-being. According to Inalhan and Finch (2004), designing a work environment that meets the worker's needs can contribute to developing an attachment to the workplace and the organization as a whole. This was confirmed in research by Velasco and Rioux (2010), who found that workers with higher workplace attachment also reported higher levels of commitment to the organization.

Further empirical contribution has confirmed that attachment to a work environment centered on the worker and his or her needs is an important predictor of key organizational outcomes, such as well-being (e.g., Rioux, 2005, 2006), engagement (e.g., Hamel et al., 2023; Mura et al., 2023a), job satisfaction (e.g., Scrima et al., 2019), organizational citizenship behaviors (e.g., Bruny et al., 2023; Nonnis et al., 2022; Rioux & Pavalache-Ilie, 2013), and protection from symptoms of work-related stress and emotional exhaustion (e.g., Rebillon et al., 2023; Scrima et al., 2021).

1.3. Place attachment, basic need satisfaction, and organizational wellbeing

Numerous researchers have concentrated on investigating the precursors of place attachment in the formative stages of various perspectives and definitions of the construct. How do the attributes of a natural or constructed environment contribute to the emergence of this affective attachment?

Over the past three decades, several scholars have sought to address this inquiry by pinpointing individual needs and their fulfillment as a potential rationale for the development of place attachment. According to the Person-Environment Fit Theory (Edwards et al., 1998; Van Vianen, 2018), the physical environment must align with the individual's needs and preferences (Gerdenitsch et al., 2018), which Gaudiino and colleagues (2023) have referred to as a "need-space fit". The motivations, indeed, stem from the anticipation of personal gain (Manfredo et al., 1996). Grounded in their physical and social attributes, environments can provide the means for achieving individual goals and obtaining psychological and social benefits (Kyle et al., 2004). In their study, for instance, Droseltis and Vignoles (2010) instructed participants to contemplate a set of places to which they felt some form of attachment. When subjects perceived that these places contributed to the satisfaction of specific needs and motives (i.e., self-esteem, continuity, distinctiveness, belonging, meaning, and security), they reported higher levels in the dimension of place attachment, as defined by the authors as self-extension/attachment. Similarly, Kyle and colleagues (2004) observed how residents' attachment to an urban park was influenced by the perceived environment and the motives it could satisfy in the intention to visit it, particularly those associated with autonomy (i.e., being alone and in peace), nature (i.e., having the opportunity to connect with a natural environment even in an urban context), and health (i.e., the possibility of engaging in physical exercise within it).

More recently, some researchers have successfully applied the theoretical framework of the Self-Determination Theory (SDT; Ryan & Deci, 2000) to the investigation of the antecedents of place attachment. According to this perspective, environments could influence the development of attachment bonds by satisfying the needs for autonomy, competence, and relatedness. In their correlational study, Landon and colleagues (2021), taking up the three dimensions of sense of place (i.e., attachment, dependence, and place identity; Jorgensen & Stedman, 2001), showed how it was dependent on the ability of wilderness areas to satisfy basic psychological needs for autonomy, competence, and relatedness. These results were later confirmed experimentally in the context of evacuation sites and environmental risk (Ariccio et al., 2021). In these studies, based on the application of SDT, the physical-spatial and social characteristics of a place contributed to the satisfaction of the three basic needs and the development or consolidation of place attachment.

Since its initial conceptualization, SDT has emerged as a primary theoretical framework in the exploration of human motivation, highlighting individuals' inherent motivational tendencies to the degree that it represents a significant element in a "Copernican turn" or a reorientation of focus within the field of human motivation (Ryan et al., 2019). SDT serves as an expansive framework for examining human motivation and personality and provides a meta-theoretical structure for organizing studies on motivation, offering a formal theory that delineates intrinsic and diverse extrinsic sources of motivation. Furthermore, SDT presents an account of the distinct roles played by intrinsic motivation and various types of extrinsic motivation in cognitive and social development, as well as in individual variations. Crucially, SDT propositions extend to the influence of social and cultural elements on individuals' sense of volition, initiative, well-being, and the caliber of their performance. According to this theory, there are "specifiable psychological and social nutrients which, when satisfied within the interpersonal and cultural contexts on an individual's development, facilitate growth, integrity, and well-being" (Ryan & Deci, 2017, p. 82). These basic needs in Self-Determination Theory are conceptually separate from motives, as they specifically outline the prerequisites for integrative and genuinely self-regulated functioning. The foundational and theoretical essence of SDT comprises six mini-theories, each formulated to elucidate specific phenomena related to motivation. These mini-theories are designed to address distinct facets of motivation and personality functioning.

The initial motivational aspect explored pertains to intrinsic motivation (Deci, 1975), characterized by engaging in an activity "for its own sake" (e.g., children's play). This early investigation into motivation laid the foundation for the development of the first mini-theory, i.e., the Cognitive Evaluation Theory (CET; Deci & Ryan, 1980). According to CET, any form of reward or punishment has the potential to undermine intrinsic motivation by shifting the perceived locus of causality externally. On the other hand, CET posits that social factors (e.g., positive feedback) that support perceived autonomy and competence can enhance intrinsic motivation.

The second mini-theory, the Organismic Integration Theory (OIT; Ryan et al., 1985a), elucidates the continuum of extrinsic motivation. Individuals tend to transition from social regulation to self-regulation; specific social factors, supported by the psychological needs of autonomy, competence, and relatedness, facilitate the movement across the motivational continuum. According to the OIT, on the social regulation end, we find external regulation, where motivation relies solely on rewards and punishments, and introjected regulation, characterized by behaviors motivated by ego-involvement processes, self-critical perfectionism, and other maladaptive behaviors for self-protection. Conversely, at the more autonomous end of the extrinsic motivation continuum, we encounter identified regulation, where individuals consciously accept the worth and value of the

activity, and integrated regulation, where identification with the activity seamlessly aligns with the values and identity of the individual.

The third mini-theory, i.e., the Causality Orientations Theory (COT; Deci & Ryan, 1985a), explores individual variations in how individuals engage with their surroundings and regulate their behavior. COT identifies and evaluates three distinct types of causality orientations. In the autonomy orientation, the individuals act based on genuine interest and value for the ongoing activities; in the control orientation, the behaviors center around rewards, gains, and seeking approval as the primary motivators for behavior; the impersonal or amotivated orientation is characterized by anxiety about competence and a lack of intrinsic motivation.

According to the fourth mini-theory, i.e., the Basic Psychological Need Theory (BNT; Ryan & Deci, 2000), which forms the central core of the theory, a fundamental set of inherent psychological needs exists, encompassing autonomy, competence, and relatedness, recognized as universally crucial for optimal human functioning and well-being. Consequently, “those practices and values that undermine or thwart their expression and satisfaction expectably yield developmental and social dysfunction and ill-being” (Ryan & Deci, 2017, p. 85). Autonomy, as a psychological need, involves the ability to self-regulate experiences and actions and take responsibility for one's behavior (Deci & Ryan, 1985b). Individuals satisfy their autonomy needs when their actions align with their authentic interests and values, demonstrating volition and willingness. In the context of Self-Determination Theory, competence pertains to the fundamental need to experience effectiveness, mastery, and control over the social environment and outcomes, manifested in behaviors such as curiosity and manipulation. Relatedness, the need for social connection, involves feeling bonded and cared for by others. This sense of relatedness is achieved through a secure feeling of belonging and connection with close individuals and active participation as a significant member of social groups (Ryan & Deci, 2000; 2017; Vansteenkiste et al., 2020).

The fifth sub-theory, i.e., the Goal Content Theory (GCT; Kasser & Ryan, 1993; 1996), highlights the significance of two categories of life goals. Extrinsic aspirations are characterized by a focus on pursuing external rewards, seeking approval from others, and achieving societal esteem. This category includes objectives like accumulating wealth, gaining popularity or fame, and cultivating an attractive image. On the other hand, intrinsic aspirations involve a focus on inherent propensities, such as fully realizing one's capacities, demonstrating care for the broader community, acting with benevolence, pursuing personal growth, fostering close relationships, contributing to the community, and maintaining physical health.

Finally, the sixth and last mini-theory, i.e., the Relationship Motivation Theory (RMT; Deci & Ryan, 2014), focuses mainly on the satisfaction of the need for relatedness for the development and

maintenance of interpersonal relationships. According to the theory, however, the satisfaction of the need for autonomy, and to some extent the need for competence, is of equal importance in cultivating a high-quality relationship, as is the satisfaction of the need for relatedness. Individuals must perceive a sense of volition within the relationship, in which both parties perceive that the other acts voluntarily, for the bond to reach a high level of quality.

From its initial theorizing to the present, Self-Determination Theory has been applied to a variety of contexts for studying the motivation of different human behaviors, such as sports activity (e.g., Block et al., 2022; Lemelin et al., 2022; Chen et al., 2022), academic and school activity (e.g., Johansen et al., 2023; Kleinkorres et al., 2023; Vansteenkiste et al., 2019), the acceptance of new technologies (e.g., Burnell et al., 2023; Jenö et al., 2022; Peters et al., 2018) or the relationship with nature and environmental protection behaviors (e.g., Baxter & Pelletier, 2020; Gauthier et al., 2022; Lee et al., 2022). The theory has since had successful application in organizational and human resource management contexts, where satisfying the needs for autonomy, competence, and relatedness is the key not only to the promotion of employees' well-being but also to the achievement of the organization's strategic and economic goals (for some recent reviews and meta-analyses see Coxen et al., 2022; Liu et al., 2016; Manganello et al., 2018; Slemp et al., 2018, 2021).

According to the perspective of Self-Determination Theory, employees attain optimal functioning when they are self-motivated, implying that they are self-empowered and willingly involved in their work due to its inherent enjoyment or value. An extensive body of research suggests that the satisfaction of basic needs and, in turn, autonomous motivation is associated with desirable work outcomes, including the reduction of burnout and distress (Fernet et al., 2012; Van den Broeck et al., 2008), organizational commitment (Ni et al., 2023), work engagement (Soyler et al., 2022), as well as performance, creativity, and proactive behaviors such as job crafting (Bindl et al., 2019; Slemp et al., 2015). As reported by Deci, Olafsen, and Ryan (2017), most research that has applied the six sub-theories of SDT to the organizational context has focused on analyzing those situational, social, and environmental factors that might affect motivation variables. For example, an important body of research has focused on leadership and management styles, identifying empowering and supporting subordinates' autonomy as a key to promoting autonomous orientation and intrinsic work motivation (e.g., Otis & Pelletier, 2005; Tafvelin et al., 2021). Other research has since focused on the role of colleagues in fostering an organizational climate based on horizontal sharing and support, ensuring that the needs for autonomy, competence, and, above all, relatedness are met (e.g., Fernet et al., 2010, 2021; Pedersen et al., 2019).

Among the contextual elements that may contribute to meeting autonomy, competence, and relatedness needs, heightened emphasis is directed toward workplace environment and space

management, especially concerning collaborative work activities with colleagues. Gatt and Jiang (2021), for instance, demonstrated that individuals in a non-territorial workplace setting, characterized by the absence of fixed locations and the freedom for workers to choose their workspaces and collaborators, reported elevated levels of autonomy in both spatial arrangements and work activities compared to those with assigned, fixed locations. This increased autonomy has been correlated with heightened job satisfaction and reduced emotional exhaustion. Brunelle and Fotin (2021) conducted a comparison of autonomy, competence, and relatedness levels between remote and office workers. As mentioned earlier, remote working inherently offers the opportunity to choose how, where, and when to carry out work activities. As indicated by the reported results, remote workers not only exhibited higher levels of overall job satisfaction but also demonstrated greater satisfaction in the needs for autonomy and work competence. Surprisingly, they also reported higher levels of relatedness compared to their office counterparts.

Chapter 2

2. Study 1

2.1. Aim of the study

The objective of Study 1 was to develop a first version of a tool for measuring the perceived environmental qualities of the remote work environment labeled Perceived Remote Working Environment Quality Indicators (PRWEQIs). Similar to what was done in previous research concerning contexts as diverse as neighborhoods (e.g., Bonaiuto et al., 2003, 2006; Fornara et al., 2010) and hospitals (e.g., Andrade et al., 2012; Fornara et al., 2006), or jails (Alves et al., 2024), here the goal is to develop an assessment tool that can provide a measure of how workers perceive the physical-spatial qualities of the home environment dedicated to remote work activity.

2.2. Method

2.2.1. Participants

In April 2021, 521 Italian university students were surveyed using the Qualtrics platform. The sample was gender-balanced, with 266 men (51.3%) and 255 women (48.7%). The average age of the participants was 21 years (min = 18; max = 31; $SD = 2.04$). Most of the participants (i.e., 456, 87.5%) were enrolled in a first-level or single-cycle degree program, while the remaining participants (i.e., 65, 12.5%) were enrolled in a second-level degree program.

2.2.2. Tool and procedure

The study was conducted under the Ethical Principles of Psychologists and Code of Conduct of the American Psychological Association (APA) and authorized by the Ethics Committee of the Sapienza University of Rome (approval number 0000408, dated 07 April 2021). Participants were asked to think about the environment where they spent most of their time carrying out their study activities remotely during the first semester of the 2020-2021 academic year (in Italy, this was a period of forced implementation of distance/remote learning due to the Covid-19 pandemic). They were then asked to complete an online survey (through the Qualtrics platform) containing the first version of the PRWEQIs, followed by socio-demographic information. Two expert architects were consulted to

determine the principal physical-spatial and ergonomic aspects that should be emphasized in developing the tool, providing their insights on which environmental quality elements warranted greater attention. With the guidance of these experts, categories of requirements were established, encompassing the following five aspects: Safety, Well-being, Usability, Appearance, and Management, as outlined in the UNI 8289:1981 standard titled "Construction, end-user needs, classification." Once the ergonomic dimensions were identified as focal points, an initial set of 20 items measuring such dimensions (i.e., the PRWEQIs) was developed. These items were rated on a 5-point Likert scale, ranging from 1 = "*Strongly disagree*" to 5 = "*Strongly agree*". In Appendix A, the original 20 items of the PRWEQIs are provided in their Italian translation. In the preliminary stage, a pre-test was conducted on 90 students enrolled in a University course in Architecture and Design to assess the comprehensibility of the items.

2.2.3. Data analysis

To verify the factorial structure of the original 20-item structure of the Perceived Remote Working Environment Quality Indicators PRWEQIs, an Exploratory Factor Analysis (EFA) was conducted through the statistical software Jamovi v. 2.2.5 (2021). Based on the criteria outlined by Sakaluk and Short (2017), the sample size of 521 participants was adequate for using such statistical technique.

2.3. Results

The Kaiser-Meyer-Olkin Measure of Sampling Adequacy and Bartlett's Test of Sphericity were conducted for the first EFA performed on the 20-item set. The results of the KMO (.867) and Bartlett's test ($\chi^2_{(190)} = 5666.55, p < .001$) confirm the suitability of the data for factor analysis (Dziuban & Shirkey, 1974). The Oblimin extraction and rotation method were chosen, given that the expected factors were not supposed to be orthogonal. Concerning the Kaiser criterion (eigenvalue > 1) and the analysis of the scree plot, the indications of Costello and Osborne (2005) were followed. The initial extraction yielded five factors with eigenvalues exceeding 1, and five items were excluded due to either factor loadings lower than .30 in all factors or loadings higher than .30 on more than one factor. The Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy for the 15-item solution was .828, above the commonly recommended value of .600 (Field, 2013). Bartlett's Test of Sphericity was also significant ($\chi^2_{(105)} = 4718.25, p < .001$). The 15-item solution, distributed across five factors (3 items per factor), accounted for 68.26% of the variance. Factor loadings, means, and standard deviations

for each item can be found in Table 1. Cronbach's Alpha values for all scales ranged from .95 to .78, indicating satisfactory reliability (Tavakol & Denick, 2011).

Table 1 – Results from an Exploratory Factor Analysis (EFA) of the Perceived Remote Workplace Environment Quality Indicators (PRWEQIs).

| Perceived remote workplace environmental quality Indicators (PRWEQIs) | Factor loading | | | | | M | SD |
|---|----------------|------------|------------|------------|------------|------|------|
| | 1 | 2 | 3 | 4 | 5 | | |
| Factor 1: Acoustic comfort | | | | | | | |
| 8. The room where I work is quiet enough | .97 | -.01 | -.07 | .03 | .03 | 3.46 | 1.23 |
| 3. In this room, noises can be heard coming from other areas of the house/environment (R) | .92 | .01 | .04 | -.01 | -.01 | 3.34 | 1.16 |
| 13. In this room, I can hear noises coming from outside (R) | .90 | .00 | .04 | -.02 | -.02 | 3.77 | 1.25 |
| Factor 2: Visual comfort | | | | | | | |
| 14. That workstation is well-lit during the day | .02 | .86 | .03 | -.02 | .02 | 4.03 | 1.11 |
| 1. I am satisfied with the lighting in this room | .06 | .86 | -.03 | .02 | .00 | 3.90 | 1.13 |
| 15. In this room during the day, there is enough natural light | -.08 | .85 | .01 | .00 | .00 | 3.97 | 1.03 |
| Factor 3: Quality of furnishing | | | | | | | |
| 5. The furniture in this room is well made | .01 | .03 | .77 | .01 | -.05 | 3.87 | .95 |
| 4. The surfaces of the furnishings of the workstation are well-made and resistant to wear | .02 | .00 | .74 | .03 | .04 | 3.96 | .92 |
| 2. The furnishings in this room are in good condition | -.01 | -.01 | .74 | .01 | .05 | 4.21 | .84 |
| Factor 4: Safety | | | | | | | |
| 12. In this room, I can move safely | -.01 | .05 | .02 | .84 | -.04 | 4.21 | .84 |
| 6. In this room, I can move without bumping into anything | .07 | .01 | -.07 | .74 | .01 | 3.76 | 1.19 |
| 11. I can move freely in that room | -.03 | -.06 | .15 | .64 | .12 | 4.32 | .94 |
| Factor 5: Space usability | | | | | | | |
| 7. In this workstation, I have all the equipment necessary for the work activity at hand | -.05 | .01 | -.06 | .09 | .79 | 4.24 | .87 |
| 10. I am satisfied with the equipment I have available in this workstation for my work activity | .04 | .03 | .06 | -.10 | .77 | 4.06 | .91 |
| 9. In this workstation, I can carry out my work activity comfortably | .10 | .02 | .13 | .14 | .51 | 3.84 | 1.01 |
| Alpha | .95 | .90 | .81 | .80 | .78 | | |

Note. $N = 521$. The extraction method was principal axis factoring with an oblique (Direct Oblimin with Kaiser Normalization) rotation. Factor loadings above .30 are in bold. Reverse-scored items are denoted with an (R). The 5-factor model explains 68% of the total variance.

Factor 1 (Acoustic comfort; Alpha = .95) encompasses assessing noise levels within the remote work environment, including external sources and noise from other areas within the house or surroundings.

Factor 2 (Visual comfort; Alpha = .90) pertains to evaluating lighting quality in the workspace. Specifically, one item assesses whether sufficient natural light is available from outside.

Factor 3 (Quality of furnishing; Alpha = .81) centers on evaluating materials used in the workplace, emphasizing their durability and resistance to wear.

Factor 4 (Safety; Alpha = .80) reflects the worker's perception of safety in the environment, ensuring freedom of movement without encountering obstacles or risks of injury.

Factor 5 (Space usability; Alpha = .78) indicates the evaluation of how functional and user-friendly the workspace is. This factor assesses whether workers can comfortably carry out their tasks with all necessary equipment readily accessible.

Table 2 shows the correlations between the five factors of the PRWEQIs. All five factors that emerged from the EFA exhibited significant correlations with each other.

Table 2 – Inter-factor correlation

| PRWEQIs Factors | F1 | F2 | F3 | F4 | F5 |
|----------------------------|----|-----|-----|-----|-----|
| F1 - Acoustic comfort | — | .18 | .18 | .25 | .22 |
| F2 - Visual comfort | | — | .34 | .32 | .33 |
| F3 - Quality of furnishing | | | — | .45 | .50 |
| F4 – Safety | | | | — | .47 |
| F5 - Space fruibility | | | | | — |

Note. All correlations are significant ($p < .001$)

2.4. Discussion

Through Study 1, a first tool for assessing users' evaluation of the work environment under remote working settings was developed. Starting from the 20 items derived from an ergonomic and objective assessment checklist of the work environment, a solution of 15 items included in five factors was obtained. The five factors that emerged can be traced back both to other perceived environmental quality indicators that have been measured by instruments with similar scope (e.g., Andrade et al., 2012; Bonaiuto et al., 2003) and to the literature on predictors of occupational well-being (for a review, see Rashid & Zimring, 2008). This first version of the PRWEQIs scale that emerged from the EFA showed suitable psychometric qualities; nevertheless, such tool version needs further verification through the use of confirmatory techniques in order to provide a more solid ground to the factorial structure. Given the PRWEQIs target, despite the parallels between students engaged in e-learning activities and remote workers, the verification of the stability of the PRWEQIs through an investigation involving a group of workers doing remote work activities, was the following step of the research project, as reported in the next chapter.

Chapter 3

3. Study 2

3.1. Aim and hypotheses

The objective of the second study is to confirm the factorial structure of the Perceived Remote Working Environment Quality Indicators (PRWEQIs) that emerged from Study 1 and to extend the results to a population of remote workers. Furthermore, the objective is to verify the existence of a second-order factor related to the overall comfort experienced in the context of remote work. In order to verify the predictive validity of the scale, the relationships between the second-order factor of the PRWEQIs and some indicators of occupational well-being were tested. In particular, stress and engagement have been identified as indicators of well-being related to occupational activity and specific tasks conducted during working hours within the remote work setting. Previous studies conducted in traditional work environments (e.g., Mura et al., 2023a; Scrima et al., 2021) have highlighted the positive impact of environmental comfort on these variables. However, no study has yet examined these relationships within the context of remote work. Additionally, remote job satisfaction was selected as an indicative measure of overall approval towards this mode of work organization. It is therefore hypothesized that:

H1: The second-order factor of the Perceived Remote Working Environment Quality Indicators (PRWEQIs), named "General perceived comfort", positively influences remote workers' work engagement.

H2: The second-order factor of the Perceived Remote Working Environment Quality Indicators (PRWEQIs), "General perceived comfort", negatively influences remote workers' work-related stress.

H3: The second-order factor of the Perceived Remote Working Environment Quality Indicators (PRWEQIs), named "General perceived comfort", positively influences remote workers' job satisfaction.

3.1. Method

3.1.1. Participants

A sample of 463 Italian workers in clerical positions in public or private sectors were recruited. The participants were actively working remotely during data collection, which took place in October 2021. Individuals who reported working remotely from places other than their homes (such as coworking spaces, pubs, or restaurants) were excluded from the analysis to maintain homogeneity of the sample. The gender distribution was 266 men (57.5%) and 197 women (42.5%), the average age was 35 years (min = 18, max = 64, $SD = 10.37$), and the average length of employment in their present organization was 7.36 years (min = 1, max = 40, $SD = 8.62$). Participants were recruited both in a private financial institution and on the Prolific platform.

3.1.2. Tool and procedure

The study was approved by the Sapienza University of Rome's Ethics Committee (approval number 0001299, dated 20 October 2021) and carried out in full compliance with the APA's Ethical Principles of Psychologists and Code of Conduct (APA) and with the Declaration of Helsinki. Through the Qualtrics platform, participants were asked to fill out an online questionnaire containing, besides the PRWEQIs tool including the 15-item solution that emerged from Study 1 (see also Mura et al., 2023b), the following measures:

Utrecht Work Engagement Scale - Short Version (UWES-9; Schaufeli et al., 2006): the Italian validation of the scale (Balducci et al., 2010), composed of 9 items, was used to evaluate the remote work engagement (Alpha = .86; e.g., “In the morning, when I get up, I want to start working”).

Perceived Stress Scale – Short Version (PSS-4; Cohen et al., 1983; 1988): the short 4-item version in the Italian validation (Mondo et al., 2022) of the scale was used to evaluate the perception of work-related stress during remote working activity (Alpha = .75; e.g., “Difficulties were piling up so high that you could not overcome them?”).

Remote Job Satisfaction Scale: the three items are derived from the scale of Job satisfaction (Lee & Brand, 2005) in their Italian adaptation to remote working (Toscano & Zappalà, 2020) was used to

evaluate job satisfaction in the activity of remote working (Alpha = .89; e.g., “In general, I am satisfied with my work in remote working”).

A 5-point Likert response scale (1 = “*Strongly disagree*”; 5 = “*Strongly agree*”) was used for all measures. Socio-demographic questions were inserted at the end of the questionnaire. In Appendix B, the items and instruments are provided in their Italian translation.

3.1.3. Data analysis

In order to confirm the factorial structure of PRWEQIs and to evaluate gender-based invariance, a Confirmatory Factor Analysis (CFA) was performed through the statistical software Mplus v. 8 (Muthén & Muthén, 2017). Multiple regressions were conducted through the statistical software Jamovi v. 2.2.5 (2021) to test the three research hypotheses.

3.2. Results

The sample collected was adequate for the CFA to be performed for the PRWQIs scale, given its low number of indicators per factor (Marsh & Hau, 2005; Myers et al., 2011; Sakaluk & Short, 2017). In order to assess the appropriateness of model fit, various indices were considered. The scores derived from these indicators serve as a metric for evaluating the goodness of fit of the model, aligning with established guidelines: the ratio of chi-square to degrees of freedom ranging from 0 to 3, a Comparative Fit Index (CFI) of $\geq .95$, a Standardized Root Mean Square Residual (SRMR) of $\leq .10$, and a Root Mean Square Error of Approximation (RMSEA) of $\leq .08$ collectively indicate a satisfactory model fit (Schermelleh-Engel et al., 2003). Due to the chi-square test's recognized sensitivity to sample size, it has not been considered (West et al., 1995; Kline, 2016). Three distinct CFA models were assessed: a unidimensional model (Model A), a model comprising five correlated factors (Model B), and a model including five primary factors and one second-order factor named "General perceived comfort" (see Table 3).

Table 3 – CFA for Perceived Remote Workplace Environment Quality Indicators (PRWEQIs).

| PRWEQIs | χ^2 | <i>df</i> | <i>p</i> | χ^2/df | CFI | SRMR | RMSEA [90% CI] |
|--|----------|-----------|----------|-------------|------|------|-------------------|
| Model A: 1-Factor Model | 2513 | 90 | < .001 | 27.922 | .419 | .139 | .241 [.233, .249] |
| Model B: 5-Factor Model | 139.08 | 80 | < .001 | 1.739 | .986 | .040 | .040 [.029, .051] |
| Model C: 5-Factor Model + 1 second-order factor | 143.89 | 85 | < .001 | 1.693 | .986 | .043 | .040 [.027, .049] |

Note. CFI = Comparative Fit Index; SRMR = (Standardized) Root Mean Square Residual; RMSEA = Root Mean Square Error of Approximation.

The findings indicate that only Models B and C demonstrated acceptable fit indices, which corroborates the outcomes of Study 1, with the 15 items saturating in their respective five first-order factors. Conversely, the model with a unique overall factor (Model A) did not yield satisfactory fit indices across any indicators. To compare the two remaining alternative models (with one nested within the other), a chi-square difference test between the more constrained model (Model C) and the less constrained one (Model B) was conducted. Given the non-significant result of the test ($\chi^2 = 4.81$; $\Delta df = 5$; $p = .44$), we can assert that the two alternative models (Model B and C) fit equally well statistically, and the more restrictive model (Model C) may be considered adequate (Kline, 1998; Schermelleh-Engel et al., 2003). The five first-order factors and the second-order factor exhibited good reliability coefficients (Acoustic comfort: Alpha = .95; Visual comfort: Alpha = .84; Quality of the furnishing: Alpha = .86; Safety: Alpha = .79; Space usability: Alpha = .84; General perceived comfort: Alpha = .87). The intercorrelations among the five factors are detailed in Table 4. A series of analyses were run to gauge the structure robustness of the chosen model and its invariance across different groups. In particular, the assessment of invariance based on gender (1 = Male; 2 = Female) was conducted through a multistage procedure in the framework of Multi-Group Confirmatory Factor Analysis (MGCFA; Byrne, 2004). The procedure is based on the chi-square difference test between two nested models: an unconstrained model and a constrained model with assumed invariance vs. non-assumed invariance, respectively. The chi-square difference test was supplemented by the computing of the CFI difference (ΔCFI), an indicator less vulnerable to the sample size sensitivity (Cheung & Rensvold, 2002).

Table 4 – Inter-factor correlation of PRWEQIs

| PRWEQIs Factors | F1 | F2 | F3 | F4 | F5 |
|----------------------------|----|-----|-----|-----|-----|
| F1 - Acoustic comfort | — | .24 | .31 | .22 | .29 |
| F2 - Visual comfort | | — | .34 | .37 | .41 |
| F3 - Quality of furnishing | | | — | .37 | .40 |
| F4 - Safety | | | | — | .44 |
| F5 - Space fruibility | | | | | — |

Note. All correlations are significant ($p < .001$)

The sample size (266 males; 197 females) was deemed sufficiently balanced for testing the invariance of the scale across genders. According to recommendations by Kline (2016) and Wang and Wang (2010), a minimum of 100 participants per group is considered adequate for conducting a Multigroup Confirmatory Factor Analysis (MGCFA). In line with Dimitrov's suggestion (2010), to assess configural invariance, the second-order model was evaluated separately for each gender group. Table 5 presents fit indices that indicate satisfactory fit for both male and female groups, affirming the configurational invariance of the PRWEQIs. Given the complex nature of structures involving higher-order factors, a series of comparisons between nested models is essential for computing invariance (Byrne & Stewart, 2006; Chen et al., 2005; Dimitrov, 2010).

Table 5 – *Configural Invariance of the Second-Order CFA Model of Perceived Remote Workplace Environment Quality Indicators (PRWEQIs) across Gender*

| Group | χ^2 | df | p | χ^2/df | CFI | SRMR | RMSEA [90% CI] |
|------------|----------|----|--------|-------------|------|------|-------------------|
| 1 = Male | 106.24 | 85 | < .001 | 1.25 | .984 | .055 | .042 [.018, .06] |
| 2 = Female | 135.81 | 85 | < .001 | 1.60 | .979 | .055 | .047 [.032, .062] |

Note. CFI = comparative fit index; SRMR = (Standardized) Root Mean Square Residual; RMSEA = Root Mean Square Error of Approximation.

Comparisons among the models utilized to assess metric (where each item contributes similarly to the underlying construct), scalar (which captures mean differences in shared variance of the items by the mean differences of the latent construct), and residual invariance (representing unexplained variance in a model) are outlined in Table 6.

Table 6 – *Testing for Factorial Invariance of a Second-Order Factor Model of PRWEQIs Across Two Groups (Gender).*

| Model | χ^2 | df | Comparison | $\Delta\chi^2$ | Δdf | CFI | ΔCFI | RMSEA |
|-------|----------|-----|------------|----------------|-------------|------|--------------|-------|
| M0 | 250.012 | 170 | - | - | - | .981 | - | .045 |
| M1 | 272.798 | 180 | M1 - M0 | 22.786 | 10 | .978 | -.003 | .047 |
| M2 | 276.181 | 184 | M2 - M1 | 3.383 | 4 | .978 | 0 | .047 |
| M3 | 303.644 | 198 | M3 - M2 | 27.463 | 14 | .975 | -.003 | .048 |
| M4 | 304.449 | 199 | M4 - M3 | .805 | 1 | .975 | 0 | .048 |
| M5 | 319.069 | 204 | M5 - M4 | 14.62 | 5 | .973 | -.002 | .049 |
| M6 | 369.765 | 219 | M6 - M5 | 50.696 | 15 | .964 | -.009 | .055 |

Note. CFI = comparative fit index; RMSEA = root mean square error of approximation; M0 = baseline model (without invariance); M1 = first-order factor loadings invariant; M2 = first-order and second-order factor loadings invariant; M3 = first-order and second-order factor loadings and item intercepts invariant; M4 = first-order and second-order factor loadings, item intercepts, and first-order factor intercepts invariant; M5 = first-order and second-order factor loadings, indicator intercepts, first-order factor intercepts, and first-order factor disturbances invariant; M6 = first-order and second-order factor loadings, indicator intercepts, first-order factor intercepts, first-order factor disturbances, and item residual variances invariant.

Model 0, where all model parameters are freely estimated, served as the baseline. Metric (or weak) invariance, denoting comparable item-factor relationships across groups, is examined in Model 1, with a constraint on the invariance of first-order factor loadings (M1 - M0: $\Delta\text{CFI} = - .003$). Model 2 extends this by constraining second-order factor loadings (M1 - M2: $\Delta\text{CFI} = 0$). Scalar (or strong) invariance is evaluated by setting factor loadings and intercepts of the items to be equal in both groups (Cheung & Rensvold, 2002). Model 3 enforces invariance on factor loadings and item intercepts (M3 - M2: $\Delta\text{CFI} = - .003$), while Model 4 includes additional constraints on the intercepts of first-order factors (M4 - M3: $\Delta\text{CFI} = 0$). Lastly, the error or residual variance introduces further constraints on measurement residuals, encompassing the uniqueness of indicators and disturbances of first-order factors. Model 5 retains the previous constraints, now applying to first-order factor disturbances (M5 - M4: $\Delta\text{CFI} = - .002$); Model 6 introduces the constraint on item uniqueness (equal variance and covariance between the two groups) (M6 - M5: $\Delta\text{CFI} = - .009$). The results obtained in the constrained model comparison thus confirmed the invariance of PRWEQIs across gender. Once the invariance of the measure on gender was verified, a series of simple linear regressions were carried out to test the research hypotheses and determine the effect of each factor of the PRWEQIs on the indicators of work-related psychological well-being. The second-order factor, labeled general perceived comfort, significantly correlated with Work Engagement ($B = .50; p < .001$), Perceived Stress ($B = - .55; p < .001$), and Remote Job Satisfaction ($B = .40; p < .001$), confirming all the three research hypotheses. Additional analyses were conducted through a series of multiple regressions to examine the effect of individual factors of the PRWEQIs, revealing a significant impact of ergonomic-spatial elements on various dimensions of work-related well-being (see Table 7). Specifically, Work Engagement was positively affected by the factors "Quality of furnishing" ($B = .22; p < .001$) and "Space usability" ($B = .16; p < 0.01$). The elements related to the work environment that provided greater preventive effect against stress symptoms were "Acoustic comfort" ($B = .15; p < .001$), "Quality of furnishing" ($B = - .16; p < .001$), and "Safety" ($B = .15; p < .01$). Lastly, "Visual comfort" ($B = .12; p < .05$) and "Space usability" ($B = .22; p < .001$) demonstrated positive effects in enhancing Remote Job Satisfaction. Ultimately, to analyze potential score differences on the five factors and the overall aggregate across levels of socio-demographic variables such as gender, age, and educational attainment, a series of multivariate analyses of variance (MANOVA) was carried out. Results revealed no statistically significant differences for all three variables.

Table 7 – Linear regression

| Effect on Work Engagement | Estimate | SE | 95% CI | | p |
|--|----------|-----|--------|------|--------|
| | | | LL | UL | |
| Intercept | 3.60 | .03 | 3.55 | 3.66 | < .001 |
| F1 - Acoustic comfort | .05 | .03 | -.01 | .01 | .11 |
| F2 - Visual comfort | .07 | .04 | -.01 | .15 | .07 |
| F3 - Quality of furnishing | .20 | .04 | .11 | .28 | < .001 |
| F4 - Safety | .07 | .05 | -.03 | .16 | .19 |
| F5 - Space usability | .15 | .05 | .06 | .24 | < .01 |
| Gender | .06 | .06 | -.06 | .17 | .34 |
| R ² | .19 | | | | |
| Effect on Perceived Stress | Estimate | SE | 95% CI | | p |
| | | | LL | UL | |
| Intercept | 2.41 | .03 | 2.35 | 2.47 | < .001 |
| F1 - Acoustic comfort | -.10 | .03 | -.16 | -.04 | < .001 |
| F2 - Visual comfort | -.08 | .04 | -.16 | .01 | .08 |
| F3 - Quality of furnishing | -.16 | .05 | -.25 | -.06 | < .001 |
| F4 – Safety | -.17 | .05 | -.28 | -.06 | < .01 |
| F5 - Space usability | -.05 | .05 | -.15 | .04 | .28 |
| Gender | .13 | .06 | .01 | .25 | < .05 |
| R ² | .19 | | | | |
| Effect on Remote Job Satisfaction | Estimate | SE | 95% CI | | p |
| | | | LL | UL | |
| Intercept | 4.26 | .04 | 4.19 | 4.33 | < .001 |
| F1 - Acoustic comfort | .01 | .04 | -.08 | .06 | .80 |
| F2 - Visual comfort | .11 | .05 | .02 | .21 | < .05 |
| F3 - Quality of furnishing | .03 | .06 | -.08 | .14 | .62 |
| F4 - Safety | .06 | .06 | -.06 | .18 | .31 |
| F5 - Space usability | .23 | .06 | .12 | .35 | < .001 |
| Gender | -.01 | .07 | -.15 | .12 | .85 |
| R ² | .11 | | | | |

Note. N = 463; CI = confidence interval; LL = lower limit; UL = upper limit.

3.3. Discussion

The second study accomplished its main objective since the factor structure identified in Study 1 was validated through Confirmatory Factor Analysis (CFA). Specifically, the 15-item scale, including the indicators of Acoustic comfort, Visual comfort, Quality of the furnishing, Safety, and Space usability, that initially emerged among Italian e-learning students, was corroborated within a sample of remote workers. The CFA results further identified a second-order factor, encompassing the overall perceived comfort within the remote work environment. This factor aggregates the previously identified specific physical-ergonomic elements derived from expert consultations in ergonomics applied to the workplace. The PRWEQIs showed satisfactory psychometric properties, as evidenced by the excellent fit indices of the model. The five first-order and second-order factors also demonstrated

outstanding reliability coefficients (Alpha ranged between .95 and .79). Multigroup CFA supported the gender-based invariance of the scale, thus confirming the factorial structure for both male and female participants. As emerged in the MANOVAs, no statistically significant distinctions emerged in the scores of the five first-order and second-order factors based on key socio-demographic characteristics (gender, age, and educational level).

Lastly, the impact of PRWEQIs on specific aspects of work-related psychological well-being was tested through regression analysis. The perception of sufficient environmental comfort in the context of remote work positively influenced engagement and remote job satisfaction, confirming hypotheses H1 and H3, respectively, and mitigating the perception of work-related stress, confirming hypothesis H2. This second study, therefore, not only corroborated the factor structure established in Study 1 but also generalized its results to remote workers. Moreover, the emersion of a summary indicator of perceived comfort during remote work, in which the five first-order factors relate to specific environmental elements, allows the correct use of either a single general dimension or multiple specific dimensions of perceived environmental quality of remote work, according to the goals of a given study.

Chapter 4

4. Study 3

4.1. Aim of the study

The main objective of Study 3 is to analyze the relationship between perceived comfort in the remote working environment, represented by the second-order factor of the Perceived Remote Working Environment Quality Indicators (PRWEQIs), identified in Study 2, and workplace attachment, particularly to the home environment having the function of the workplace during remote work activity. In addition, the study aims to extend the scientific literature regarding place attachment by studying its possible antecedents, represented by the needs identified by the Self-Determination Theory (SDT; Ryan & Deci, 2000).

In particular, Study 3 aims to analyze how the environmental characteristics of a place contribute to the satisfaction of autonomy, competence, and relatedness needs, enabling the development of the attachment bond to place.

The study will be divided into two sub-studies: one correlational (3a) and one experimental (3b). Specifically, by presenting two experimental scenarios (high vs. low condition), perceived comfort in a remote work environment will be manipulated in Study 3b by measuring autonomy, competence, relatedness needs, and remote workplace attachment.

4.2. Study 3a

4.2.1. Aim and hypotheses

The study aims to analyze, through the lenses of Self-Determination Theory (Ryan & Deci, 2000), how the environmental characteristics of the remote workplace, by means of the satisfaction of place-related needs such as autonomy, competence, and relatedness, can contribute to developing the affective bond of remote workplace attachment.

As demonstrated by previous studies (e.g., Ariccio et al., 2021; Droseltis & Vignoles, 2010; Gatt & Jiang, 2021; Landon et al., 2021), the perception of environmental comfort facilitates the satisfaction of specific needs related to the place. When such needs are confirmed, an attachment bond to the place is formed. In particular, Landon and colleagues (2021), in a study on natural parks, demonstrated how the environmental characteristics of the park contributed to the satisfaction of basic needs identified by SDT (Self-Determination Theory). These physical-spatial features, in fact, allowed visitors to feel more autonomous and competent in exploring the area and furthermore, facilitated relationships with other individuals within the same context.

However, these studies have relied on experimental manipulations (e.g., Ariccio et al., 2021) or recollections of place characteristics (e.g., Landon et al., 2021). No study has yet employed specific indicators for assessing the subjective perception of physical-spatial environmental qualities in the investigation of the relationship between comfort, needs, and place attachment. Furthermore, no study has extended this research to the context of remote work. Specifically, it is hypothesized that:

H1: Perceived comfort in the remote work environment (PRWEQIs) is positively associated with the satisfaction of place-related needs, i.e. autonomy (H1a), competence (H1b), and relatedness (H1c).

H2: Satisfaction of place-related needs of autonomy (H2a), competence (H2b), and relatedness (H2c) is positively associated with remote workplace attachment.

H3: The three place-related needs, i.e., autonomy (H3a), competence (H3b), and relatedness (H3c), mediates the relationship between comfort in the remote work environment (PRWEQIs) and remote workplace attachment.

4.2.2. Method

4.2.2.1. Participants

The study comprised 307 Italian-employed individuals recruited from both the public (15.6%) and private (82.7%) sectors, all of whom engaged in at least one day of remote work per week during the data collection period (February-March 2023). All participants reported utilizing their residence as their designated remote workspace. Among these, 171 (55.7%) were male, with an average age of 33 years ($SD = 8.92$; range: 20-63) and organizational tenure ranging from 1 to 40 years ($M = 4.58$; $SD = 5.78$). On average, the participants engaged in remote work for approximately three days per week ($SD = 1.40$).

4.2.2.2. Tools and procedure

The study adhered to the Ethical Principles of Psychologists and Code of Conduct outlined by the American Psychological Association (APA) and received ethical approval from the Ethics Committee of Sapienza University of Rome (approval number 85/203, dated 27 September 2023). Appropriately trained psychology trainees recruited participants. Following informed consent for data processing, participants proceeded to complete an online self-report questionnaire encompassing the following measures:

Perceived Remote Workplace Environment Quality Indicators (PRWEQIs; Mura et al., 2023b). The scale consists of the 15 items ($\text{Alpha} = .86$) selected in Study 1 (and confirmed in Study 2), representing five factors related to perceived environmental comfort in the setting used for remote work, investigating aspects of acoustic comfort (e.g., "The room where I work is quiet enough"), visual comfort (e.g., "In this room during the day, there is enough natural light"), quality of furnishing (e.g., "The furnishings in this room are in good condition"), safety (e.g., "In this room, I can move safely") and space usability (e.g., "In this workstation, I have all the equipment necessary for the work activity at hand").

Place-related SDT Basic Psychological Need Satisfaction. Nine items were adapted from the Basic Need Satisfaction in Relationships Scale (La Guardia et al., 2000) and Ariccio and colleagues' (2021) study. The items analyze how well the remote workplace meets the needs for autonomy (3 items; $\text{Alpha} = .71$; e.g., "This place makes me feel free to make my own decisions"), competence (3 items;

Alpha = .84; “*This place makes me feel able to complete challenging activities*”), and relatedness (3 items; Alpha = .85; e.g., “*This place makes me feel emotionally close to other people*”).

Remote Workplace Attachment. We adapted to the remote work context the four items (Alpha = .83; e.g., “*This workplace is my favorite place to work*”) of the place attachment factor of the Sense of Place scale (Jorgensen & Stedman, 2001).

For all measures, the response scale was a 5-step Likert scale (from 1 = “*Strongly disagree*” to 5 = “*Strongly agree*”). At the end of the questionnaire, sociodemographic data, namely gender, age, organizational seniority, and sector, and days worked at home per week, were collected from the study participants. In Appendix C, the items of Place-related SDT Basic Psychological Need Satisfaction and Remote Workplace Attachment are provided in their Italian translation.

4.2.2.3. Data analysis

The research hypotheses were tested using the Model 4 of the PROCESS macro v3.5 (Hayes, 2017) within the SPSS v.26 software. In this analytical framework, perceived comfort in the remote work environment (PRWEQIs) was designated as the independent variable (IV), the three needs outlined in SDT (autonomy, competence, and relatedness) were posited as parallel mediators, and remote workplace attachment was the dependent variable (DV). Furthermore, calculations for bootstrap confidence intervals were conducted to evaluate the indirect effects of all three mediations, with 95% confidence intervals and 10000 bootstrapping iterations. Gender, age and the frequency of remote work days per week were incorporated into the model as covariates. To ensure ample statistical power, an a priori power analysis was executed using Monte Carlo simulation via the method advocated by Schoemann and colleagues (2017). Estimating a small-to-medium effect (.30) for the relationship between all variables in the model with 5000 Power Analysis Replications (20000 Monte Carlo Draws for Replications) and a confidence level of 95%, the sample collected was sufficient to achieve a power of .80 in estimating all the three indirect effects.

4.2.3. Results

A Confirmatory Factor Analysis (CFA) was performed using Jamovi 2.2.5 (2021) to validate the statistical structure of the Perceived Remote Workplace Environment Quality Indicators (PRWEQIs). The results in Table 8 reveal that the single-factor model (Model A) does not report satisfactory fit indices, unlike Models B and C, as per established criteria (Hu & Bentler, 1999; Kline, 2011;

Schermelleh-Engel et al., 2003). To compare the two remaining alternative models (with nested parameters), a chi-square difference test was conducted between the more constrained model (Model C) and the less constrained model (Model B). As the chi-square test was not significant ($\Delta\chi^2 = 5.66$; $\Delta df = 5$; $p = .34$), it was deemed appropriate to present the model that incorporates a second-order factor linked to perceived environmental comfort in the context of remote work (Pavlov et al., 2020). Table 9 provides information on means, assessment of univariate normality, and correlations between the variables under investigation. None of the measures violated the normality assumption, as indicated by skewness and kurtosis values within the -1 to +1 range.

Table 8 – CFA for Perceived Remote Workplace Environment Quality Indicators (PRWEQIs)

| PRWEQIs | χ^2 | <i>df</i> | <i>p</i> | χ^2/df | CFI | NNFI | SRMR | RMSEA [90% CI] |
|--|----------|-----------|----------|-------------|-----|------|------|-------------------|
| Model A: 1-Factor | 1084.22 | 90 | < .001 | 12.05 | .53 | .45 | .14 | .19 [.18, .20] |
| Model B: 5-Factor | 127.40 | 80 | < .001 | 1.59 | .98 | .97 | .04 | .04 [.03, .06] |
| Model C: 5-Factor + 1 Second Order Factor | 133.10 | 85 | < .001 | 1.57 | .98 | .97 | .04 | .04 [.03, .06] |

Note. CFI = comparative fit index; NNFI = (Non) Normed Fit Index; SRMR = (Standardized) Root Mean Square Residual; RMSEA = Root Mean Square Error of Approximation.

The correlation analysis revealed positive associations between the three place-related needs identified by Self-Determination Theory: autonomy was positively correlated with competence ($r = .65$, $p < .001$) and relatedness ($r = .27$, $p < .001$), which in turn exhibited a positive correlation with competence ($r = .39$, $p < .001$). High levels of perceived comfort in the remote work context (PRWEQIs) were linked with high levels of satisfaction in autonomy ($r = .52$, $p < .001$), competence ($r = .57$, $p < .001$), relatedness ($r = .27$, $p < .001$), and attachment to the same workplace ($r = .44$, $p < .001$). The latter variable also demonstrated positive correlations with autonomy ($r = .49$, $p < .001$), competence ($r = .51$, $p < .001$), and relatedness ($r = .43$, $p < .001$). Concerning socio-demographic variables, gender, and frequency of remote workdays did not show significant correlations with any of the study variables. Conversely, age displayed positive correlations with place-related need satisfaction of competence ($r = .16$, $p < .01$) and relatedness ($r = .14$, $p < .05$), as well as perceived comfort in the remote work environment ($r = .15$, $p < .05$). Overall, it emerged that better environmental configurations from a physical-spatial perspective were associated with higher levels of remote workplace attachment.

Table 9 – Descriptive statistics and bivariate correlations.

| Variable | <i>M</i> | <i>SD</i> | <i>S</i> | <i>K</i> | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|--------------------------------|----------|-----------|----------|----------|------|-------|------|--------|--------|--------|--------|---|
| 1. Gender | — | — | — | — | — | | | | | | | |
| 2. Age | 32.80 | 8.92 | 1.17 | .94 | -.08 | — | | | | | | |
| 3. Day in RW | 3.22 | 1.40 | .23 | -.60 | .01 | .13* | — | | | | | |
| 4. PRWEQIs | 4.00 | .53 | -.56 | .16 | -.07 | .15* | .05 | — | | | | |
| 5. P-RN Autonomy | 4.14 | .55 | -.41 | .06 | -.04 | .06 | -.01 | .52*** | — | | | |
| 6. P-RN Competence | 3.83 | .73 | -.37 | -.12 | -.01 | .16** | .07 | .57*** | .65*** | — | | |
| 7. P-RN Relatedness | 2.96 | .96 | .03 | -.61 | -.07 | .14* | -.03 | .27*** | .27*** | .39*** | — | |
| 8. Remote Workplace Attachment | 3.42 | .84 | -.09 | -.51 | -.04 | .08 | .02 | .44*** | .49** | .51*** | .43*** | — |

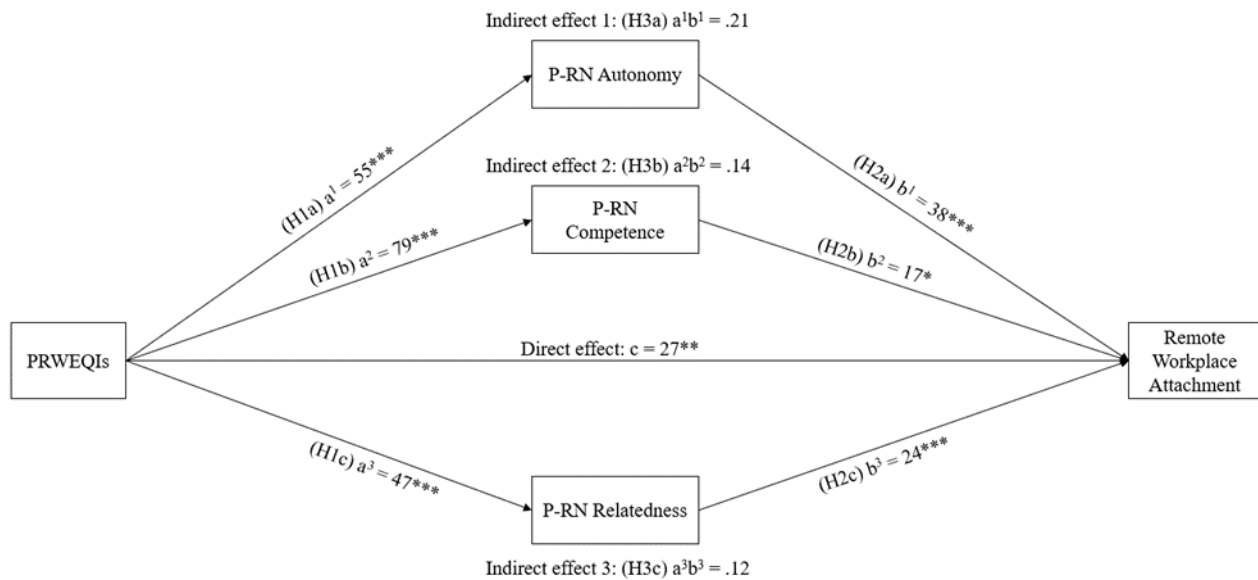
Note. * = $p < .05$; ** = $p < .01$; *** = $p < .001$; *M* = Mean; *SD* = Standard deviation; *S* = Skewness; *K* = Kurtosis; Gender (1 = M; 2 = F); RW = Remote working; PRWEQIs = Perceived Remote Workplace Environment Quality Indicators; P-RN = Place-related need.

The results of the mediation model are presented in Figure 3. Regarding the relationship between comfort and place-related needs, H1 was fully supported. Indeed, statistically significant positive effects emerged in the relationship between PRWEQIs and PR-N for autonomy (H1a: $B = .55, p < .001$), competence (H1b: $B = .79, p < .001$), and relatedness (H1c: $B = .47, p < .001$), explaining 29%, 36% and 9% of the variance, respectively. Also, for H1, there were no statistically significant effects of gender, age, and remote work days.

The results also supported the hypotheses regarding H2; the dependent variable, remote workplace attachment, was positively associated with PR-N for autonomy (H2a: $B = .38, p < .001$), competence (H2b: $B = .17, p < .05$), and relatedness (H3b: $B = .24, p < .001$), explaining 41% of the variance. Significant effects of gender, age, and remote work days did not emerge for H2 either.

Finally, concerning H3, the indirect effects analysis confirmed how the comfort experienced in the remote work environment that supports the satisfaction of place-related needs of autonomy, competence, and relatedness might contribute to greater remote workplace attachment. Indeed, partial mediating effects emerged from the PR-Ns for autonomy (H3a: $B = .21, BootSE = .06, BootLLCI = .07, BootULCI = .33$), competence (H3b: $B = .14, BootSE = .07, BootLLCI = .01, BootULCI = .21$), and relatedness (H3c: $B = .12, BootSE = .03, BootLLCI = .06, BootULCI = .18$) regarding the relationship between PRWEQIs and remote workplace attachment.

Figure 3 – Effect of Perceived Comfort in the Remote Work Environment (PRWEQIs) on Remote Workplace Attachment through Place-related Need for Autonomy, Competence, and Relatedness.



Note. Dependent variable: Remote Workplace Attachment; $R = 0.47$; $R^2 = 0.22$ ($F_{(4,302)} = 21.09$, $p < .001$); Indirect effect of P-RN Autonomy: $B = .21$, BootSE = .06, BootLLCI = .07, BootULCI = .33. Indirect effect of P-RN Competence: $B = .14$, BootSE = .07, BootLLCI = .01, BootULCI = .21. Indirect effect of P-RN Relatedness: $B = .12$, BootSE = .03, BootLLCI = .06, BootULCI = .18.

4.2.4. Discussion

Based on foundational literature in interpersonal attachment (Bowlby, 1969, 1982; Ainsworth, 1979), a place can be characterized as a "safe haven" when it fulfills specific individual needs, allowing for retreat from threats, problem-solving, and emotional relief (Scannell et al., 2021, p. 47). While there are commonalities between interpersonal attachment theory and place attachment (Scannell & Gifford, 2014), which characteristics of a place contribute to becoming a safe haven remains to be elucidated. Each attachment to a place entails emotional and mnemonic aspects as well as distinct physical and environmental attributes. According to the meaning-mediated model of place attachment (Stedman, 2003), individuals do not form direct attachments to the physical qualities of a place; instead, they develop connections to the symbolic significance associated with those features.

This is particularly pertinent in the context of workplace attachment, where various physical-spatial elements emerge as significant predictors of worker well-being (Kallio et al., 2020). Inalhan and Finch (2004) argued that studying workplace attachment is crucial due to its role in fostering a sense of community, bolstering employee loyalty, and serving as an indicator of organizational culture. Building on the concept of a "safe haven," Study 3a empirically examined how the remote work environment, especially its physical-spatial attributes, can become an object of attachment capable of satisfying specific place-related needs, specifically those about autonomy, competence, and

relatedness. Consistently with the first hypothesis (H1), a higher level of perceived comfort in the remote work environment corresponded with greater satisfaction regarding place-related needs for autonomy, competence, and relatedness. Gatt and Jiang's (2021) research found that individuals in a flexible work environment (in which employees could choose where and with whom to work within the office) reported a higher level of autonomy in managing their workspace. Similarly, participants who perceived a high level of comfort in their remote work environment felt that the environment supported them in making autonomous decisions about how and where to carry out their work tasks and felt competent in executing them effectively. Noteworthy and warranting further investigation is the result related to H1c, where, even in remote working conditions, the physical environment facilitated the fulfillment of the need for relatedness and, consequently, the maintenance of social and emotional relationships with others. However, it should be noted that the items used for PR-N for relatedness did not specifically refer to coworkers but to other people in general. A comfortable spatial configuration designated for work activities within the home environment may have, on one hand, ensured the maintenance of contact with other people within the home environment and, on the other hand, guaranteed conversational, acoustic, and visual privacy necessary to communicate with coworkers even when located remotely without being overheard or interrupted (Sundstrom et al., 1986). H2 is also fully substantiated: the satisfaction of place-related needs for autonomy, competence, and relatedness resulted in the remote worker developing a greater sense of attachment to the workplace, perceiving it as a "safe haven" for carrying out work activities. These results align with previous research findings, such as those of Landon and colleagues (2021) regarding natural wild environments and Ariccio and colleagues (2021) for evacuation sites in a virtual location affected by natural hazards, wherein the satisfaction of SDT needs emerged as a pivotal element in the development of place attachment. Finally, despite the study revealing a direct effect between comfort and workplace attachment, confirming previous studies in the literature (e.g., Nonnis et al., 2022; Scrima et al., 2021), the third hypothesis (H3) was also confirmed, demonstrating an indirect effect of PRWEQIs on remote workplace attachment for PR-N through autonomy, competence, and relatedness. Given the definition of remote work as an activity that can be conducted at any time and any place (Grant et al., 2013), it is unsurprising that the indirect effect of PR-N for autonomy is the most robust of the three, illustrating how workers tend to develop a stronger attachment to a home environment that, through its environmental characteristics and configurations, fosters a greater sense of autonomy in conducting work remotely.

4.3. Study 3b

4.3.1. Aim and hypotheses

The objective of Study 3b is to confirm with an experimental procedure the findings from the previous correlational study (Study 3a), where it was found that environmental comfort generates greater attachment to the remote workplace through the satisfaction of three place-related needs, i.e., autonomy, competence, and relatedness. In their experimental study, Ariccio and colleagues (2021) demonstrated how the physical-spatial characteristics of an evacuation site contributed to the satisfaction of Place-related needs. By manipulating the features of the evacuation site, such as its size, safety, and available resources, users felt more autonomous in navigating the environment, competent in handling the crisis situation, and capable of maintaining relationships with other survivors. The satisfaction of these place-related needs contributed to the development of place attachment, addressing the sense of displacement arising from the crisis situation. For Study 3b, a similar procedure was employed, presenting two experimental scenarios by manipulating the five factors of PRWEQIs. Despite the inherent limitations associated with manipulating environmental comfort through textual scenarios without intervening in the actual work environments of the participants, this study represents the first experimental approach to investigating the relationship between comfort, Place-related needs, and place attachment in the context of remote work. Specifically, the hypotheses are the same as Study 3a, that is:

H1: Participants in the high-comfort environmental condition have significantly higher mean scores in both the three place-related needs (i.e., autonomy, competence, and relatedness) and the remote workplace attachment than participants in the low-comfort environmental condition.

H2: The relationship between environmental comfort and remote workplace attachment is mediated by the satisfaction of the three place-related needs (autonomy, competence, and relatedness).

4.3.2. Method

4.3.2.1. Participants

As this study is based on the presentation of experimental scenarios, the sample recruited for Study 3b did not necessarily have to meet the criteria of previous studies (remote workers/students). A total

of 311 participants were enlisted, consisting of 124 (39.9%) males and 180 (57.9%) females, while 7 (2.3%) participants chose not to specify their gender. The average age of the participants was 35 years (min = 18; max = 69; $SD = 12.74$). At the time of recruitment in October 2023, 103 (33.1%) were university students, 9 (2.9%) were doctoral students or university researchers, 186 (59.8%) were employed, and 13 (4.2%) were unemployed. Among the participants, 107 (34.4%) indicated prior experience with remote work, while 98 (31.52%) reported currently working remotely at least one day per week. The majority of participants held a bachelor's or master's degree ($n = 201$; 64.7%), 35 held a Ph.D. (11.3%), 70 (22.5%) possessed a high school diploma, and only 5 had education below the level of a high school diploma (1.6%). All participants were Italian and were recruited among students from a University course and within public sector organizations.

4.3.2.2. Tools and procedure

The study followed the Ethical Principles of Psychologists and Code of Conduct set forth by the American Psychological Association (APA) and obtained ethical clearance from the Ethics Committee at Sapienza University of Rome (approval number 85/203, issued on 27 September 2023). This study employed a between-groups experimental design, assigning each participant to one of two experimental conditions (high environmental comfort vs. low environmental comfort). The study was conducted through an online questionnaire on the "Qualtrics" platform. After reading the informed consent on the purpose of the research and agreeing to participate in it, the same incipit was presented for both levels of the scenario:

"Imagine that you have just moved to a new city and have been hired by the company "WellWork" for the job you sought and succeeded in getting. By working contract, the WellWork company requires its employees to work three days remotely and two days in the office. For this reason, you have just moved to a new house where you live alone and do your work during the three days that, by contract, you spend in smart working".

After reading the incipit, each participant was randomly assigned to one of two experimental conditions. Both scenarios described a home environment in which to carry out their activities on remote workdays and were based on the five dimensions of the Perceived Remote Workplace Environment Quality Indicators (PRWEQIs; Mura et al., 2023b), presenting information on acoustic and visual well-being, furniture quality, and usability and safety of the space dedicated to work activity.

In the high-comfort condition, participants read the following scenario:

“In your new home, you have a room to be used solely as a remote workstation, which will have the sole function of an office. This room is spacious, and you can move freely without bumping into anything. The room is well furnished with quality and functional furniture: in particular, on the large desk made of natural materials, you can have all the equipment you need for your work at hand. The room overlooks a frequented park, and at peak hours, it is quiet, with no noise coming from outside. Natural light filters through the window, illuminating the room's interior and allowing you to work during the day while keeping artificial lights off. The spaces are large and can be easily managed according to your needs”.

In the low-comfort condition, participants read the following scenario:

“In your new home, you have a room to be used as a remote workstation, which will also function as a bedroom. This room is small, and you must move carefully to avoid bumping into anything. The room is simply furnished with basic and general furnishings: in particular, on the small desk made of artificial materials, you can keep only some of the equipment you need for your work activity within reach. The room overlooks a busy street, and at peak hours, it is noisy because you can hear noises from outside. From the window, buildings across the street leave the inside of the room in shadow, and it is best to work while keeping artificial lights on. The spaces are tight and require attention to be managed according to your needs”.

In Appendix D, the scenarios are provided in their Italian translation. In order to assess that the manipulative scenarios worked for both conditions, five items ($\text{Alpha} = .96$) were presented for the manipulation check, adapted from the PRWEQIs (*“This room is a good environment in which to work”*; *“In this room, I can move around safely”*; *“In this room, I can work quietly”*; *“In this room, during the day, I can take advantage of natural light”*; *“If necessary, I can manage the spaces in the room to my liking”*), to which participants were to respond according to a 5-step Likert scale (1 = *“Totally false”*; 5 = *“Totally true”*). Before realizing the main study, the two manipulations and the manipulation check were tested through a pilot-test involving 50 participants (25 per condition), which showed satisfactory results. In light of the encouraging results from the piloting phase, the 311 participants were randomly assigned to one of the two experimental conditions for the main study. After completing the manipulation check for both experimental conditions, participants were asked to complete a questionnaire containing the following measures:

Place-related SDT Basic Psychological Need Satisfaction. As for Study 3a, the nine items adapted from the Basic Need Satisfaction in Relationships scale (La Guardia et al., 2000) and Ariccio and colleagues' (2021) study were used. The items analyze how well the remote workplace meets the needs for autonomy (3 items; Alpha = .84; e.g., “*This place makes me feel free to make my own decisions*”), competence (3 items; Alpha = .90; “*This place makes me feel able to complete challenging activities*”), and relatedness (3 items; Alpha = .88; e.g., “*This place makes me feel emotionally close to other people*”).

Remote Workplace Attachment. As for Study 3a, the four items of the place attachment factor (Alpha = .91; e.g., “*This workplace is my favorite place to work*”) of the Sense of Place scale (Jorgensen & Stedman, 2001) adapted to the remote work context were used.

For all measures, the response scale was a 5-step Likert scale (from 1 = “*Strongly disagree*” to 5 = “*Strongly agree*”). At the end of the questionnaire, sociodemographic data (i.e., gender, age, educational level, and occupation) were collected from the study participants.

4.3.2.2. Data analysis

The two research hypotheses were assessed using SPSS v.26 statistical software. H1 was tested through a one-way MANOVA (Multivariate Analysis of Variance), while H2 was verified, analogously to what was done for Study 3a, by using the Model 4 of the PROCESS macro version 3.5 (Hayes, 2017). Additionally, bootstrap confidence intervals were computed to assess the indirect effects of all three mediations, employing 95% confidence intervals and 10000 bootstrapping iterations. Gender, age, and occupation were included in the model as covariates. To determine the necessary sample size for comparisons between the two experimental conditions, an a priori power analysis was conducted using G*Power with the statistical test “t-Test: Difference between two independent means” (Faul et al., 2009). Based on the results obtained from the prior correlational study, assuming an effect size of .30 and an Alpha level of .05, a total of 278 participants (139 per condition) were deemed sufficient to achieve a power of .80. However, in consideration of the power analysis conducted for the earlier correlational study, the minimum sample size was increased to ensure adequate statistical power for retesting the parallel mediation model.

4.3.3. Results

A one-way ANOVA was conducted in order to test the effect of experimental manipulations on the manipulation check. The analysis revealed a statistically significant difference between the two experimental conditions (low vs. high comfort) in the manipulation check scores [$F_{(1,309)} = 1295.81$, $p < .001$, $\eta^2_p = .81$]. Participants in the high-comfort experimental condition did, in fact, report a statistically higher mean on the manipulation check ($M = 4.49$; $SD = .60$) than the mean reported by those in the low-comfort experimental condition ($M = 1.81$; $SD = .71$). Table 10 shows the preliminary analysis and correlation analysis between the variables under consideration. Given the strong correlation between the measures and the adherence to a normal distribution within the range of -1 to +1 for all measures, the data satisfied the assumptions of MANOVA.

Table 10 – Descriptive statistics and bivariate correlations.

| Variable | <i>M</i> | <i>SD</i> | <i>S</i> | <i>K</i> | 1 | 2 | 3 | 4 | 5 |
|--|----------|-----------|----------|----------|--------|--------|--------|--------|---|
| 1. Manipulated environmental comfort (-1, 1) | — | — | — | — | — | | | | |
| 2. P-RN Autonomy | 3.57 | .97 | -.38 | -.49 | .54*** | — | | | |
| 3. P-RN Competence | 3.26 | 1.10 | -.23 | -.76 | .66*** | .78*** | — | | |
| 4. P-RN Relatedness | 2.15 | .95 | .75 | .22 | .33*** | .45*** | .53*** | — | |
| 5. Remote Workplace Attachment | 2.75 | 1.11 | .05 | -.98 | .71*** | .68*** | .76*** | .52*** | — |

Note. * = $p < .05$; ** = $p < .01$; *** = $p < .001$; *M* = Mean; *SD* = Standard deviation; *S* = Skewness; *K* = Kurtosis; Manipulated environmental comfort: - 1 = low-environmental comfort; 1 = high-environmental comfort; P-RN = Place-related need.

Therefore, to test the first research hypothesis (H1), the two experimental conditions were included as a fixed factor, and the three Place-Related Needs (autonomy, competence, and relatedness) and remote workplace attachment as dependent variables. The comprehensive MANOVA yielded a significant result [$F_{(4,306)} = 92.60$, $p < .001$, *Wilks's A* = .45, $\eta^2_p = .55$]. This indicates that considering the intercorrelations among the dependent variables, the manipulation of environmental comfort did indeed exert an influence on them. Regarding the individual dependent variables, a positive effect of environmental comfort emerged for all three, showing significantly different means in the expected direction between the high-comfort and low-comfort conditions (see Table 11), fully confirming H1. As hypothesized, based on the experimental manipulation, statistically significant differences emerged for all three place-related needs, specifically autonomy, [$F_{(1,309)} = 125.81$, $p < .001$, $\eta^2_p = .29$], competence [$F_{(1,309)} = 238.20$, $p < .001$, $\eta^2_p = .44$], and relatedness, [$F_{(1,309)} = 37.88$, $p < .001$, $\eta^2_p = .11$], and for remote workplace attachment [$F_{(1,309)} = 311.39$, $p < .001$, $\eta^2_p = .50$].

In order to test the second research hypothesis (H2) and to confirm the results of the previous correlational study with an experimental procedure, a parallel mediation model was tested, with the experimental condition (low vs. high environmental comfort) as the independent variable (IV), the three place-related needs for autonomy (M1), competence (M2), and relatedness (M3) as parallel mediators, and remote workplace attachment as the dependent variable (DV). Gender, age, and occupation were added as covariates in the mediation model. The results revealed a substantial overall effect in the model ($B = .71, p < .001$), confirming the research hypotheses, accounting for 69% of the variability.

Table 11 – *Descriptive statistics across experimental conditions*

| | Low-comfort condition | | High-comfort condition | |
|-----------------------------|-----------------------|-----------|------------------------|-----------|
| | <i>M</i> | <i>SD</i> | <i>M</i> | <i>SD</i> |
| P-RN Autonomy | 3.07 | .89 | 4.11 | .72 |
| P-RN Competence | 2.56 | .91 | 4.00 | .71 |
| P-RN Relatedness | 1.85 | .81 | 2.48 | .98 |
| Remote Workplace Attachment | 1.99 | .84 | 3.55 | .72 |

Note. *M* = Mean; *SD* = Standard deviation; *N* = 311; *n* for low-comfort condition = 160; *n* for high-comfort condition = 151.

As hypothesized, there was a direct effect of the independent variable (experimental conditions) on remote workplace attachment ($B = .37, p < .01$), explaining 51% of the variance for the dependent variable. Regarding the direct effect, covariates such as gender, age, and occupation did not exhibit statistically significant effects. In summary, it was observed that enhanced environmental arrangements, particularly in terms of physical-spatial aspects, were linked to greater levels of attachment to remote workplaces. In relation to the effect of the experimental manipulation on the three place-related needs, statistically significant effects emerged for the need for autonomy ($B = .54, p < .001$), competence ($B = .67, p < .001$), and relatedness ($B = .33, p < .001$), explaining 30%, 44%, and 15% of the variance, respectively. As expected, the satisfaction of the three place-related needs had a positive and significant effect on the dependent variable. Specifically, remote workplace attachment was significantly predicted by the need for autonomy ($B = .20, p < .001$), competence ($B = .27, p < .001$), and relatedness ($B = .16, p < .001$). Finally, the analysis of indirect effects confirmed how the comfort experienced in the remote work environment (experimental condition), which facilitates the satisfaction of place-related needs for autonomy, competence, and relatedness, may contribute to a stronger attachment to the remote workplace. Indeed, partial mediating effects were

observed for autonomy ($B = .11$, $BootSE = .04$, $BootLLCI = .05$, $BootULCI = .17$), competence ($B = .18$, $BootSE = .04$, $BootLLCI = .10$, $BootULCI = .26$), and relatedness ($B = .05$, $BootSE = .02$, $BootLLCI = .03$, $BootULCI = .09$), with a significant total indirect effect ($B = .34$, $BootSE = .04$, $BootLLCI = .27$, $BootULCI = .41$), pertaining to the association between experimentally manipulated environmental comfort and remote workplace attachment. Both H2 and the results of the correlational study are thus fully confirmed through the experimental design.

4.3.4. Discussion

As previously mentioned (see section 1.3), despite the numerous definitions of place attachment and an important body of literature highlighting its effects on psychosocial well-being (e.g., Scannell & Gifford, 2017a), a still debated and widely studied area concerns its antecedents and the relationship between place attachment and motivational needs. Study 3b aimed to confirm the results of the previous correlational study (Study 3a) through an experimental procedure, thus expanding the literature inherent in the relationship between comfort, needs, and place attachment.

In line with H1, it was found that participants exposed to the high-comfort experimental scenario, representing a home-work environment fully aligned with the key elements outlined in the literature pertaining to comfort in work environments and captured in the PRWEQIs measure, reported elevated levels across all three place-related needs, as well as a greater sense of attachment to the remote workplace, compared to those in the low-comfort experimental condition. These findings robustly support H1, corroborating earlier research that, whether employing experimental or correlational methodologies, demonstrated that mentally engaging with a place, whether through visualization, imagination, or reenactment, heightens feelings of attachment towards it (e.g., Ariccio et al., 2020; Scannell & Gifford, 2017b). Furthermore, this study's results underscore the significance of the environmental context and physical-spatial attributes in fostering place attachment. Reese and colleagues (2019) emphasized the adaptable nature of residential place attachment by prompting participants to envision a loss of specific physical (e.g., parks, infrastructure, etc.) and social (e.g., family or friendship ties) aspects of their place of residence, leading to a significant decline in levels of place attachment. Consequently, the outcomes of Study 3b shed light on how the physical-spatial variables within a remote/domestic work environment align with the most frequently cited and studied Indoor Environmental Quality (IEQ) factors in the literature (e.g., Al Horr, 2016; Radun & Hongisto, 2023), including a quiet setting, ample natural light, and suitability for work tasks in terms of safety, ease of use, and adaptability, all contribute to the development of a sense of attachment to the place. These findings confirm the significance of environmental attributes in fulfilling motivational needs

(e.g., Droseltis & Vignoles, 2010; Scannell & Gifford, 2017; van Riper et al., 2019). About H2, it was corroborated too. According to the research of Ariccio and colleagues (2021) and Landon and colleagues (2021), environments that facilitate the fulfillment of the three NTB needs (autonomy, competence, and relatedness) lead to a heightened sense of attachment to the place itself. In the context of remote work environments, this implies that workers develop a sense of attachment to the workspace when its physical attributes enable them to have greater autonomy in decision-making and space management, enhance their competence in performing job tasks, and foster opportunities for social interaction within the space. Hence, the findings related to H2 validate the results of the preceding correlational study through an experimental approach that involved manipulating the perceived environmental comfort within the remote work setting. However, in accordance with the observations of Pirlott and MacKinnon (2016) regarding mediation models, while the manipulation of the independent variable alone (in this case, environmental comfort in the remote work environment) allows inferences about causal relationships between the independent variable and mediators (PR-Need for autonomy, competence, and relatedness), as well as between independent and dependent variables (remote workplace attachment), it does not enable inferences about causality between the mediators and the dependent variable.

Therefore, the primary limitation of this study lies in the inability to confirm the tested mediation model fully. Nevertheless, this manipulation has enabled the experimental confirmation of the direct link between environmental comfort and attachment to the remote workplace, which will be further explored in the subsequent correlational study (Study 4).

Chapter 5

5. Study 4

5.1. Aim and hypotheses

Having established with Studies 3a and 3b how, through the satisfaction of place-related needs, perceived environmental comfort can positively influence attachment to the remote workplace, the goal of Study 4 is to determine how this attachment can contribute to greater remote work engagement through the satisfaction of autonomy, competence, and relatedness work-related needs. Just as it occurs in interpersonal attachment (e.g., Baumeister & Leary, 1995; La Guardia et al., 2000), attachment to a place, too, can ensure the satisfaction of certain needs when it is positive and functional. Numerous studies have, for instance, highlighted how place attachment supports the satisfaction of the need for belonging to a social group, strengthening the bonds of affiliation with it (e.g., Hidalgo & Hernández, 2001; Kyle et al., 2004). Through an experimental procedure, Scannell & Gifford (2017) demonstrated that place attachment visualizations increased participants' levels of self-esteem, meaning, and belonging. Suppose the physical-spatial characteristics of a place constitute the predictor of place-related needs, specifically in the person-environment relationship, transitioning to the individual component. In that case, place attachment can be an important predictor in satisfying needs related to other contexts, such as those in the workplace. Despite numerous studies demonstrating how specific aspects of the work context, such as leadership styles (e.g., Kovjanic et al., 2012) and colleague support (e.g., Pedersen et al., 2016), or job characteristics (e.g., Trépanier et al., 2015), can contribute to the satisfaction of job-related needs, no research has yet explored how workplace attachment may contribute to making the employee feel more autonomous and competent in their job and facilitate relationships with other members of the organization. Furthermore, this research represents the first approach to studying the relationship between workplace attachment and work-related needs in the context of remote work. Specifically, it is hypothesized that:

H1: In accordance with results from Study 3b, perceived comfort in the remote work environment (PRWEQIs) is positively associated with remote workplace attachment.

H2: Remote workplace attachment is positively associated with satisfaction of work-related needs of autonomy (H2a), competence (H2b), and relatedness (H2c).

H3: Satisfaction of work-related needs of autonomy (H3a), competence (H3b), and relatedness (H3c) is positively associated with remote work engagement.

H4: Remote workplace attachment, through supporting the satisfaction of work-related needs of autonomy (H4a), competence (H4b), and relatedness (H4c), is positively associated with remote work engagement.

5.2. Method

5.2.1. Participants

The study sample comprised 440 workers engaged in remote work during the data collection period (June-July 2022). This included 233 male participants (53%) recruited from both public (14%) and private (86%) sectors. Their ages ranged from 19 to 63 years, with a mean age of 34 years ($SD = 9.80$). On average, they had been with their respective organizations for six years (min = 1; max = 40; $SD = 7.41$). All participants indicated they conducted their work activities within their private residences, averaging three days per week ($SD = 1.56$).

5.2.2. Tool and procedure

The study followed the ethical guidelines the American Psychological Association (APA) set forth and adhered to the Ethical Principles of Psychologists and Code of Conduct. The research received approval from the Ethics Committee of Sapienza University of Rome (approval number 0000741, dated 06 June 2022). Participants were selected by psychology students with appropriate training. Before participating, individuals were given information about the study's objectives and asked to read and complete an informed consent form for data processing. Subsequently, participants completed an online self-report questionnaire that included the measures listed below:

Perceived Remote Workplace Environment Quality Indicators (PRWEQIs; Mura et al., 2023b). The scale consists of 15 items ($\text{Alpha} = .91$).

Remote Workplace Attachment. We adapted the four items ($\text{Alpha} = .80$) of the place attachment factor of the Sense of Place scale to the remote work context (Jorgensen & Stedman, 2001).

Work-Related Basic Psychological Needs Satisfaction and Frustration Scale (Chen et al., 2015; Schultz et al., 2015). We used the three need-satisfaction factors of autonomy (4 items; Alpha = .71; e.g., “*I feel a sense of possibility of choice and freedom in the things in which I engage*”), competence (4 items; Alpha = .76; e.g., “*I feel confident that I can do my job to the best of my ability*”) and relatedness (4 items; Alpha = .90; e.g., “*I feel connected to colleagues who support me and whom I care about*”), adapted to the context of remote working.

Remote Work Engagement. We adapted the Work Engagement Scale Short Version (UWES-9; Schaufeli et al., 2006) in its Italian validation (Balducci et al., 2010) for the context of remote working (9 items; Alpha = .87; e.g., “*When I work remotely, I am enthusiastic about my job*”).

A 5-point Likert response scale (ranging from 1 = “*Strongly disagree*” to 5 = “*Strongly agree*”) was used for all measures. Participants were also asked to provide their sociodemographic information, including gender, age, organizational seniority, sector, and the number of days they worked from home per week. In Appendix E, the items of the Work-Related Basic Psychological Needs Satisfaction and Frustration Scale are provided in their Italian translation.

5.2.3. Data analysis

The research hypotheses were assessed using the model 81 of the PROCESS macro v3.5 (Hayes, 2017) within the SPSS v.26 software. In this analytical framework, perceived comfort in the remote work environment (PRWEQIs) was established as the independent variable (IV), with remote workplace attachment acting as the initial mediator, followed by the three work-related basic psychological needs (autonomy, competence, and relatedness) as successive parallel mediators. Remote work engagement was designated as the dependent variable (DV). Additionally, bootstrap confidence intervals were computed to assess the indirect effects of all three mediations. This procedure involved employing 95% confidence intervals and conducting 10000 bootstrapping iterations. In the model, gender, age, and the number of days worked remotely were included as covariates. To determine the necessary sample size for hypothesis testing, an a priori power analysis was carried out using G*Power version 3.1.9.7 (Faul et al., 2007). The results indicated that a sample size of $N = 390$ was required to achieve 80% power in detecting a small-to-medium effect at a significance level of Alpha = .05. Consequently, the sample size obtained was deemed adequate for testing the research hypotheses.

5.3. Results

As preliminary analyses, the factorial structures of all multi-factor scales were analyzed through Confirmatory Factor Analysis (see Table 12). Concerning work-related needs and engagement in remote work, the two B-models demonstrated excellent fit indices (Hu & Bentler, 1999; Kline, 2011; Schermelleh-Engel et al., 2003). Specifically, confirming the original structure of the tools, a 3-factor solution (autonomy, competence, and relatedness) emerged for work-related needs, and 3-factor models with a second-order factor (vigor, dedication, and absorption) for work engagement. A chi-square test was conducted, given the equivalence between models B and C for PRWEQIs. As it yielded a non-significant result ($\Delta\chi^2 = 8.85$; $\Delta df = 5$; $p = .12$), the 5-factor model with the second-order factor (linked to perceived environmental comfort in the remote work context) solution was adopted (Pavlov et al., 2020). As in previous studies, for Study 4, the summary factor of PRWEQIs and that of work engagement were employed.

Table 12 – CFA for Perceived Remote Workplace Environment Quality Indicators (PRWEQIs), Remote Work Engagement, and Work-Related Needs.

| PRWEQIs | χ^2 | <i>df</i> | <i>p</i> | χ^2/df | CFI | NNFI | SRMR | RMSEA [90% CI] |
|---|----------|-----------|----------|-------------|-----|------|------|-------------------|
| Model A: 1-Factor | 1430.73 | 90 | < .001 | 15.90 | .66 | .61 | .10 | .18 [.18, .19] |
| Model B: 5-Factor | 276.93 | 80 | < .001 | 3.46 | .95 | .93 | .07 | .07 [.06, .09] |
| Model C: 5-Factor + 1 Second Order Factor | 285.78 | 85 | < .001 | 3.36 | .95 | .94 | .07 | .07 [.06, .08] |
| Work-Related Needs | χ^2 | <i>df</i> | <i>p</i> | χ^2/df | CFI | NNFI | SRMR | RMSEA [90% CI] |
| Model A: 1-Factor | 692.86 | 54 | < .001 | 2.55 | .70 | .63 | .12 | .16 [.15, .18] |
| Model B: 3-Factor | 129.96 | 51 | < .001 | 12.83 | .96 | .95 | .05 | .06 [.15, .07] |
| Remote Work Engagement | χ^2 | <i>df</i> | <i>p</i> | χ^2/df | CFI | NNFI | SRMR | RMSEA [90% CI] |
| Model A: 1- Factor | 852.49 | 27 | < .001 | 31.57 | .63 | .51 | .13 | .26 [.26, .28] |
| Model B: 3-Factor + 1 Second Order Factor | 121.34 | 24 | < .002 | 5.06 | .97 | .94 | .08 | .10 [.08, .11] |

Note. CFI = comparative fit index; NNFI = (Non) Normed Fit Index; SRMR = (Standardized) Root Mean Square Residual; RMSEA = Root Mean Square Error of Approximation.

Table 13 provides the mean values, assessment of univariate normality, and correlations among the variables under scrutiny. None of the measures violated the normality assumption, as evidenced by skewness and kurtosis values falling within the range of -1 to +1. The only exception was the skewness value of the W-RN autonomy, which remained within an acceptable range (Byrne, 2010;

George & Mallery, 2010; Hair et al., 2010). From the correlation matrix analysis, the independent variable, i.e., PRWEQIs, exhibited positive correlations with all variables in the model. Specifically, it was correlated with remote workplace attachment ($r = .60, p < .001$), the three work-related needs of autonomy ($r = .22, p < .001$), competence ($r = .45, p < .001$), and relatedness ($r = .39, p < .001$), as well as remote work engagement ($r = .41, p < .001$). The first mediator of the model, remote workplace attachment, was also positively correlated with remote work engagement ($r = .49, p < .001$) and the three work-related needs of autonomy ($r = .30, p < .001$), competence ($r = .40, p < .001$), and relatedness ($r = .32, p < .001$). Finally, statistically significant correlations were observed between remote work engagement and autonomy ($r = .63, p < .001$), competence ($r = .58, p < .001$), and relatedness ($r = .51, p < .001$). Concerning socio-demographic variables, age was correlated with all variables in the model except WR-N for autonomy ($r = .07, p = \text{n.s.}$). Higher age was indeed correlated with greater perceived comfort in the remote work environment ($r = .23, p < .01$), remote workplace attachment ($r = .23, p < .001$), work-related needs for competence ($r = .23, p < .001$), and relatedness ($r = .26, p < .001$), as well as remote work engagement ($r = .24, p < .001$).

Table 13 – Descriptive statistics and bivariate correlations.

| Variable | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
|--------------------------------|--------|--------|-------|--------|--------|--------|--------|--------|------|
| 1. Gender | — | | | | | | | | |
| 2. Age | .19 | — | | | | | | | |
| 3. Day in RW | -.06 | -.11* | — | | | | | | |
| 4. PRWEQIs | .01 | .23** | -.06 | — | | | | | |
| 5. Remote Workplace Attachment | .03 | .23*** | .02 | .60*** | — | | | | |
| 6. W-RN Autonomy | -.02 | .07 | .15** | .22*** | .30*** | — | | | |
| 7. W-RN Competence | .09 | .23*** | .09 | .45*** | .40*** | .49*** | — | | |
| 8. W-RN Relatedness | .23*** | .26*** | -.04 | .39*** | .32*** | .34*** | .46*** | — | |
| 9. Remote work engagement | .09 | .24*** | .02 | .41*** | .49*** | .63*** | .58*** | .51*** | — |
| Mean | — | 33.91 | 3.09 | 4.02 | 3.57 | 3.78 | 4.19 | 3.86 | 3.62 |
| Standard Deviation | — | 9.80 | 1.56 | .66 | .80 | .64 | .56 | .82 | .71 |
| Skewness | — | .78 | 4.61 | -.78 | -.50 | -.33 | -.76 | -.70 | -.65 |
| Kurtosis | — | -.17 | -.81 | .49 | -.17 | .05 | 1.19 | .31 | .40 |

Note. * = $p < .05$; ** = $p < .01$; *** = $p < .001$; Gender (1 = M; 2 = F); RW = Remote working; PRWEQIs = Perceived Remote Workplace Environment Quality Indicators; W-RN = Work-related need.

The four research hypotheses were tested through a sequential mediation model, and all effects were controlled for the covariates of gender, age, and remote workdays. Figure 4 shows the results of the model used for testing the research hypotheses. The total effect of the model was positive and significant ($B = .39, p < .001$), and no direct effect of PRWEQIs on remote work engagement emerged ($B = .01, p = \text{n.s.}$). Thus, as per the hypothesis, the relationship between the variables is mediated by remote workplace attachment and the three work-related needs.

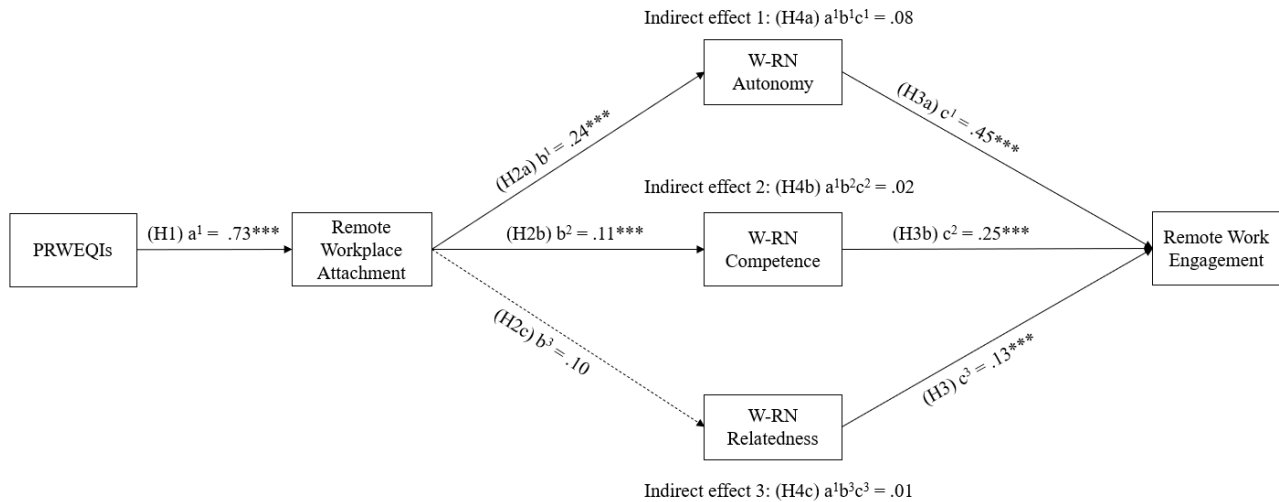
The first research hypothesis (H1) was fully confirmed, and PRWEQIs were found to be positively associated with greater remote workplace attachment ($B = .73, p < .001$).

As for H2, the hypothesis was only partially confirmed: there was, in fact, a significant effect of remote workplace attachment on satisfaction of work-related needs for autonomy (H2a: $B = .24, p < .001$), explaining 13% of the variance, and competence (H2b: $B = .11, p < .01$), with 27% of the variance explained, but not on relatedness (H2c: $B = .10, p = \text{n.s.}$).

All three hypotheses regarding the relationship between work-related needs satisfaction and remote work engagement were, however, confirmed: remote work engagement was indeed positively associated with WR-N for autonomy (H3a: $B = .45, p < .001$), competence (H3b: $B = .25, p < .001$), and relatedness (H3c: $B = .13, p < .01$), explaining 58% of its variance.

Because H2c was not significant, Hypothesis H4, concerning sequential indirect effects, was only partially confirmed. If, specifically, the relationship between PRWEQIs and remote workplace attachment was found to be sequentially mediated by remote workplace attachment and WR-N for autonomy (H4a: $B = .08, \text{BootSE} = .02, \text{BootLLCI} = .04, \text{BootULCI} = .12$) and competence (H4b: $B = .02, \text{BootSE} = .01, \text{BootLLCI} = .01, \text{BootULCI} = .05$), the indirect effect for WR-N for relatedness was not statistically significant (H4c: $B = .01, \text{BootSE} = .01, \text{BootLLCI} = -.01, \text{BootULCI} = .03$).

Figure 4 – Effect of Perceived Comfort in the Remote Work Environment (PRWEQIs) on Remote Work Engagement through Remote Workplace Attachment and Work-related Need for Autonomy, Competence, and Relatedness.



Note. Dependent variable: Remote Work Engagement; $R = 0.76$; $R^2 = 0.58$ ($F_{(8,426)} = 73.24, p < .001$); Indirect effect of Remote Workplace Attachment and W-RN Autonomy: $B = .08$, BootSE = .02, BootLLCI = .04, BootULCI = .12. Indirect effect of Remote Workplace Attachment and W-RN Competence: $B = .02$, BootSE = .01, BootLLCI = .01, BootULCI = .04. Indirect effect of Remote Workplace Attachment and W-RN Relatedness: $B = .01$, BootSE = .01, BootLLCI = -.01, BootULCI = .03.

5.4. Discussion

While the positive impact of place attachment on well-being is increasingly recognized (e.g., Korpela et al., 2020; Rollero & De Piccoli, 2010), there is a need for further investigation into the psychological mechanisms that connect place attachment with well-being factors. One of the fundamental attributes of place attachment is its capacity to address specific human needs (e.g., Relph, 1976; Tuan, 1990) and facilitate the self-regulation processes essential for achieving goals (Korpela, 1989). The objective of Study 4 was to examine how attachment to the home workplace could fulfill work-related needs for autonomy, competence, and relatedness, consequently leading to increased work engagement in remote workers.

In line with earlier research findings (e.g., Rebillon et al., 2023; Mura et al., 2023a) and the outcomes of Study 3a, hypothesis H1 was substantiated, as perceived quality indicators of the remote workplace environment (PRWEQIs) positively predicted attachment to the remote workplace. Once again, these results validate how attachment to a place, consistent with the Person-Process-Place (PPP) framework (Scannell & Gifford, 2010), is contingent on the physical and spatial attributes of the attached environment. The outcomes of Hypothesis H2 are particularly noteworthy as they delve into how attachment to the remote workplace may contribute to meeting work-related needs. Drawing from classical interpersonal attachment theory, many studies have demonstrated that secure attachment aids

in fulfilling autonomy, competence, and relatedness needs (for an overview, see La Guardia & Patrick, 2008). Through experimental designs, Scannell and Gifford (2017b) illustrated how visualizing an attachment environment, while not impacting the need for control and affect, led to an augmented sense of belonging, self-esteem, and meaningfulness. In our study, the second hypothesis (H2) was only partially corroborated: while heightened attachment to the remote workplace played a role in meeting work-related needs for autonomy (H2a) and competence (H2b), a statistically significant effect for the work-related need for relatedness (H2c) did not materialize.

This absence of a significant relationship might be attributed to the unique study context. A key consequence of remote work is the social isolation from the organization (Bentley et al., 2016) and a lack of in-person interactions, both formal and informal, with colleagues (e.g., Bjursell et al., 2021; Waizenegger et al., 2020). Increased attachment to the remote workplace, while not negatively impacting relationships with coworkers and a sense of belonging to the organization, may not directly contribute to fulfilling the need for relatedness. The well-established influence of fulfilling the needs outlined by Self-Determination Theory (SDT) on work engagement finds support in the scientific literature (e.g., Gagné et al., 2014; Hicklenton et al., 2019; Roussillon Soyer et al., 2021), as confirmed by the results concerning H3. Even in the remote context, the need for autonomy emerged as the most influential predictor of work engagement, underscoring the importance of remote workers having autonomy in deciding how, when, and especially where to conduct their work activities. Finally, Hypothesis H4 is partially confirmed, providing empirical evidence on how the relationship between environmental comfort and remote work engagement is sequentially mediated by attachment to the remote workplace and the fulfillment of work-related needs for autonomy and competence, though not for relatedness.

Chapter 6

6. Discussion and implication

6.1. General discussion

In essence, the goal of this project was to understand how the shift from a purely domestic environment to an environment that overlaps private and work life may have impacted the feeling of attachment to the place and the well-being of the worker engaged in the remote work activity. The research project, overall, addressed the following main points: (1) analyze how the physical-spatial characteristics of the home-work environment could, through the satisfaction of certain needs, influence the affective bond of attachment to place; (2) analyze how attachment to place contributed to the satisfaction of work-related needs and, consequently, to the well-being and engagement of the remote worker. Collectively, the findings from the four studies, employing both correlational and experimental methodologies, strongly validate the significance of environmental elements within the home setting, particularly in the context of their intersection with the work environment. Aligning with the Person-Process-Place (PPP) framework (Scannell & Gifford, 2010), it becomes evident that characteristics specific to a place play a pivotal role in shaping the attachment individuals develop toward their remote workplace. Furthermore, consistent with the principles of the Person-Environment Fit (P-E) Theory (Caplan, 1983; 1987), the ideal alignment between environmental attributes and an individual's characteristics, as reflected in their work-related needs, emerges as the primary catalyst for fostering well-being in the context of remote work.

Specifically, starting from quantifiable and objective indicators related to the ergonomic attributes of workspaces, Study 1 and 2 allowed the development of an initial scale for evaluating the perceived physical-spatial qualities of environments designated for remote work, named Perceived Remote Workplace Environment Quality Indicators (PRWEQIs). The factorial structure of PRWEQIs, which emerged from Study 1 and confirmed in Study 2 (i.e., acoustic comfort, visual comfort, quality of furnishing, safety, and space usability), enabled the discernment of environmental dimensions frequently documented in Indoor Environmental Quality (IEQ) literature, known for their substantial impact on worker well-being, productivity, and satisfaction (e.g., Al Horr, 2016; Radun & Hongisto, 2023), as confirmed by the results of the multiple regressions of Study 2, highlighting a positive impact of perceived comfort in the workplace on engagement, job satisfaction, and perceived stress. Moreover, Multigroup Confirmatory Factor Analysis (MGCFAs) validated the factorial structure of PRWEQIs across both male and female remote workers, thus not showing, in contrast to findings for

other variables in the remote work context (e.g., Adisa et al., 2021; Allen et al., 2015), a statistically significant gender-based difference in perceptions of the qualities of the home environment devoted to work activity.

The subsequent studies aimed to analyze the determinants of workplace attachment and its consequences on promoting work-related well-being, extending the results to remote work contexts. Starting from the hypothesis that needs are domain-specific, Study 3a incorporated the needs for autonomy, competence, and relatedness within the context of place and its characteristics.

The analysis focused on examining their roles as antecedents of place attachment. The outcomes of this study validate prior research findings (e.g., Ariccio et al., 2021; Landon et al., 2021), indicating that the place component of the PPP framework, facilitated by specific spatial and ergonomic configurations, can fulfill the fundamental and inherent needs of individuals, thereby fostering the development of remote workplace attachment. Through an experimental design, particularly by manipulating the comfort in the remote work environment, Study 3b facilitated the confirmation of causal relationships among variables. It demonstrated specifically how environmental characteristics serve as predictors of place attachment.

In this context, it is more likely to establish an affective bond with a place that, through its physical-spatial attributes, can support individual activities. As shown by Studies 3a and 3b, such a place is also capable of fulfilling the fundamental needs of the individual.

Contrarily, to examine the correlation between attachment to the remote workplace and work engagement in Study 4, there was an incorporation of needs directly associated with work tasks rather than focusing on the environmental features of the workplace. The study aligns with the theoretical framework of research that has predominantly demonstrated, especially in the context of romantic relationships, how a secure attachment style with a partner can contribute to the satisfaction of autonomy, competence, and overall relationship satisfaction needs, thus fostering a general sense of satisfaction in the couple relationship (La Guardia & Patrick, 2008). Similarly, akin to interpersonal attachment, Scannell and Gifford (2017b) experimentally demonstrated how place attachment can also contribute to the satisfaction of specific basic needs. Within this framework, the needs for autonomy, competence, and relatedness are construed as outcomes of attachment: the emotional connection to the workplace augments the fulfillment of work-related needs, thereby contributing to work-related well-being, as represented by work engagement in the study.

In accordance with the Person-Environment Fit (P-E) Theory, the study empirically demonstrated the significance of the fit between the environment and individual characteristics. The sense of attachment to the remote workplace was shown to contribute to the worker experiencing a heightened sense of competence and autonomy in their work activities.

Consequently, this enhanced attachment facilitated greater absorption, dedication, and vigor in carrying out work tasks. Despite empirical evidence in the literature confirming the relationship between work-related needs and engagement (e.g., Kovjanic et al., 2013), as well as between engagement and the workplace (e.g., Mura et al., 2023a), Study 4 has provided initial empirical confirmation on how the latter relationship is mediated by the satisfaction of basic needs, particularly those related to autonomy and competence. Expanding on these findings, the study underscores the integral role that place attachment plays in shaping the psychological experience of remote work.

The establishment of a strong emotional connection with the remote workplace not only fosters a sense of competence and autonomy but also acts as a catalyst for heightened engagement and commitment to work responsibilities.

This nuanced understanding of the interplay between individual attributes and the remote work environment sheds light on the complex dynamics influencing occupational well-being in the evolving landscape of remote work.

6.2. Implications

The presented research has broad theoretical and practical implications regarding the physical environment, place attachment, and basic need satisfaction.

First, the research led to the development and validation of the first indicator of perceived environmental quality in the remote work context. Numerous instruments or indicators for measuring environmental satisfaction in the classic office setting are present in the literature. Among them, the Scale of Satisfaction with the Workspace by Fleury-Bahi & Marcouyeux (2011) identifies two macro dimensions for environmental satisfaction: comfort/functionality and control/privacy. The Functional Comfort Questionnaire, developed by Fischer & Vischer (1997), encompasses seven satisfaction factors: air quality, comfort associated with staff-generated noise, thermal comfort, spatial comfort, privacy, lighting, and comfort related to non-staff-generated noise. The Work Environment Satisfaction Scale (*Echelle de Satisfaction Environnementale au Travail* - ESET; Moffat et al., 2015; Scrima et al., 2015) analyzes the work environment, inside and outside the office on ten dimensions (i.e., equipment, safety, tranquility, transportation, sociability, stores, environmental alienation, neighborhood pleasantness, green spaces, and organizational pleasantness). As concerns the tool here presented, i.e., the Perceived Remote Workplace Environment Quality Indicators (PRWEQIs), it incorporates some dimensions that have emerged in other indicators gauging perceived environmental quality (e.g., Bonaiuto et al., 2003, 2006; Fornara et al., 2010; Andrade et al., 2012; Fornara et al., 2006; Alves et al., 2024), by integrating additional physical-spatial dimensions typical and

characteristic of work environments, and it represents, to the best of our knowledge, the first formal and validated instrument designed for comparable assessments of the remote worker's perception regarding essential Indoor Environmental Quality (IEQ) factors.

This tool addresses an environmental context that, until now, has received limited attention in the literature, as emphasized by Bergefurt and colleagues (2022). From the point of view of scientific research, the use of PRWEQIs can contribute to extending the existing literature on the person-environment relationship and to the study of the effects of physical-spatial elements in promoting psychological well-being. On a pragmatic level, PRWEQIs play a crucial role in both the design and assessment phases. As established by the Italian Legislative Decree 81/08 and its subsequent amendments and integrations, based on the former European Union Framework Directive 89/391/EEC, each organization is required to conduct periodic assessments of work-related stress. Among the stressors assessed, particular attention is given to those of environmental and ergonomic nature, in addition to psychosocial and organizational stressors. Although recent updates have begun to integrate references to remote working, the legislation still lacks guidelines for assessing the related environmental stressors in workplaces dedicated to this type of work organization. In this regard, the incorporation of PRWEQIs into specific self-report questionnaires for assessing work-related stress in remote working could prove to be a valuable resource for organizations.

The intricacies of remote work, often carried out in home settings, pose challenges for objective and expert evaluations of environmental and ergonomic attributes. In contrast, a self-report instrument, enabling a subjective evaluation of environmental qualities, serves as a valuable tool.

This not only empowers the individual worker, who intimately interacts with the environment, but also provides pertinent insights for company stakeholders. These insights guide targeted interventions, including the optimization of lighting, management of acoustic comfort, and creation of ergonomic configurations for furniture.

Such interventions facilitate a nuanced adaptation of remote work environments, aligning them with the ergonomic and perceptual preferences of individual workers. Viewed through a corporate lens, PRWEQIs emerge as a strategic instrument for shaping corporate policies tailored to the realm of remote work. The data gleaned from this scale can be instrumental in formulating organizational guidelines that foster optimal working conditions for remote staff, thereby contributing substantively to their overall well-being and productivity. In the preliminary phases following the decision to adopt remote working, PRWEQIs, as it happens in participatory design, can provide indications to workers and organizations on which elements must be present for the construction of an ergonomic and supportive setting for the person as a whole work activity.

In addition, the research is an important advance in the literature and study of place attachment. As reported by Scannell and Gifford (2017a, p. 376), “further work is needed to determine whether psychological needs are antecedents to place attachment; this knowledge could inform planners [...] that wish to encourage place attachment”. Using the framework of Self-Determination Theory (Ryan & Deci, 2000), this research project tried to contribute to the understanding of the psychological dynamics involved. Particularly evident in Studies 3a and 3b, the investigation underscores the significance of fulfilling autonomy, competence, and relationship place-related needs as precursors to the formation of place attachment. The physical attributes of a location, such as Indoor Environmental Quality (IEQs), function as facilitators, allowing individuals to experience a heightened sense of autonomy, a perception that one's actions are voluntary and deliberate, and of competence, the capability to execute behaviors effectively in the current context, and a mastery over the environment to achieve specific outcomes.

Moreover, even in environments that inherently entail social detachment, notably within professional settings like the workplace, the satisfaction of these needs fosters interpersonal connections despite physical distancing from colleagues. In essence, these findings shed light on the supportive role of the environment. Once an individual masters their surroundings by fulfilling these three fundamental needs, it sets the stage for the development of a profound attachment to the place.

Furthermore, diverging from prior research investigating the role of place-related motivations and needs as precursors to place attachment, which often relied on methods such as reenactments of attachment places (e.g., Landon et al., 2021; Scannell & Gifford, 2017b; Droseltis & Vignoles, 2010), ad hoc experimental scenarios (e.g., Ariccio et al., 2021), or in-situ data collection (e.g., van Riper et al., 2019), this study not only represents the pioneering effort to examine the antecedents of place attachment in the context of remote work but, specifically in Study 3a, it innovatively incorporates a perceived environmental quality indicator to analyze how a place can satisfy individual needs in fostering attachment development.

Moreover, the research, particularly in Study 4, yields significant implications and insights into the consequences of place attachment. This study aligns with the expanding body of research emphasizing the positive impact of place attachment on occupational and organizational well-being (e.g., Inalhan, 2009; Inalhan & Finch, 2004; Mura et al., 2023a; Rebillon et al., 2023; Scrima et al., 2022). Considering the well-established correlation between fundamental work-related needs and well-being, substantiated by numerous studies rooted in the theoretical framework of SDT (Coxen et al., 2022; Liu et al., 2016; Manganelli et al., 2018), Study 4 affirms how a heightened sense of attachment to the workplace contributes to the fulfillment of autonomy and competence needs consequently fostering greater work engagement.

Moreover, the findings prompt further contemplation on the necessity for relatedness, especially in the context of remote work. While Studies 3a and 3b reveal that the characteristics of a place facilitate the satisfaction of the need for relatedness, thereby sustaining social connections and fostering place attachment, remote work, as highlighted in Study 4, does not contribute to the satisfaction of the same need in maintaining relationships with colleagues. In line with this viewpoint, as postulated by Wang and colleagues (2020), it is suggested that the satisfaction of work-related needs for relatedness and belongingness during remote work is contingent upon organizational support and the efficacy of communication between leaders and workers, as well as between workers and their colleagues.

These elements are posited as critical determinants in fostering a sense of connection and belonging in the remote work environment. In summary, the research substantiates the hypothesis that distinct contextual needs can be met through various mechanisms. The satisfaction of place-related needs, such as the capacity for independent and competent management and the sense of connection with others within the place, is contingent upon its structural attributes. These attributes facilitate person-environment interaction, culminating in the development of an affective bond with the place. Likewise, the fulfillment of work-related needs can be enhanced by the attachment bond to the environment where work activities transpire, whether it be a traditional workplace or, as evidenced by the research, the home environment designated for remote work. These findings not only deepen our understanding of the intricate dynamics between personal, environmental, and occupational factors but also underscore the practical implications for cultivating a positive and enriching remote work experience.

6.3. Limitations

While the research has yielded crucial empirical insights and contributed to the literature on the person-work environment relationship by expanding its scope to remote working environments, it is not exempt from certain limitations.

The primary and overarching limitation stems from the specific context under scrutiny in this research, along with the ensuing measurement employed for its examination. Despite the robust psychometric properties demonstrated by PRWEQIs, they inherently represent an observer-based and "naïve" measure (Gifford, 2002). This characterization implies that the scale relies on individual perceptions of the physical-spatial attributes within the dedicated remote work environment. While the development of PRWEQIs drew upon an ergonomic checklist for objective assessment, specifically the UNI 8289:1981 standard titled "Construction, end-user needs, classification," a noteworthy limitation lies in the absence of objective, expert evaluations of the studied environments

throughout the research. This limitation is not exclusive to the current study, rather it is pervasive across past and future research in the realm of remote work environments. In traditional centralized work settings, universally experienced by all organization members, obtaining objective and expert evaluations for comparison with individual perceptions of office environmental qualities is feasible. However, in the case of remote work, characterized by the convergence of home/private and work environments and a one-to-one environment-worker ratio, this procedural approach becomes virtually unattainable and exceedingly resource-intensive. The inherent complexities and unique circumstances of remote work environments present a considerable challenge in implementing such objective assessments, accentuating the pragmatic constraints encountered in this research domain. In this case, even a self-completion of an ergonomic checklist, exactly like the one used for the development of PRWEQIs, would result in a subjective assessment based on individual perceptions and not on objective, expert criteria. Thanks to technological advancements, an increasing number of digital tools, both on the hardware and software fronts, allow for easier collection of objective environmental data. Available technologies for mobile devices (such as HDR photography or image analysis software incorporating quantitative and semantic variables) can provide an opportunity to complement subjective assessment with some objective environmental data. However, the complexity of an individual's work environment, such as the home office setting, still poses challenges in collecting and processing this type of information.

In a broader context, the limitation regarding the subjectivity of responses can be extended to all other measures and variables included in the research, characterized by the use of self-report questionnaires and, consequently, potentially distorted or inaccurate due to factors such as social desirability impacting the overall reliability and validity of the gathered data. In addition, the lack of similar measures did not allow further evaluation of the convergent and divergent validity of PRWEQIs.

Despite the thesis focusing on the overlap between the home and work environments, a further limitation arises from the lack of information regarding the house itself. While data on participants' work sphere were collected, there is a dearth of information concerning the person-house relationship, such as the duration of residence, the amount of daily time spent in it, and, crucially, their attachment to it. This limitation has particularly precluded a comparison between place attachment to the home as a workplace and place attachment to the home per se. Similarly, attachment to one's own traditional work environment could also influence the remote work experience.

A further limitation that must be taken into account is given by the sampling method, which was characterized by the use of convenience samples of volunteers recruited only in the Italian context; this limitation, in addition to not allowing generalizability of the results to cultures and worlds of work other than the Italian one, does not allow us to exclude a self-selection bias.

Particularly for Studies 2 and 4, due to their cross-sectional nature, it is impossible to establish causal links between the variables used in the tested models. The scientific literature concerning place attachment still lacks experimental studies that provide evidence of its antecedents and psychological benefits. The experimental approach becomes even more complex in the context of remote working, where it is challenging to structurally intervene in the home environment to assess how perceived comfort may influence the remote worker's need satisfaction, attachment, and well-being.

Even when using an experimental design (Study 3b aimed at confirming the results of correlational Study 3a), in accordance with the guidelines of Pirlott and MacKinnon (2016), the manipulation of the environmental comfort in the remote work environment allows inferences to be drawn about the causal relationships between it and the basic psychological needs of autonomy, competence, and relatedness, as well as between comfort and attachment to the remote workplace. However, this does not enable inferences about the causality between the mediators and the dependent variable.

6.4. Future directions

Although the research provides valid results, several research questions await further investigation. First of all, for the study of the antecedents and consequences of place attachment, the research used SDT as the basic theoretical framework. Specifically, within the framework of Basic Psychological Need Theory (BNT), the study posited that autonomy, competence, and relatedness are the three essential, intrinsic, and foundational needs crucial for human well-being (Ryan & Deci, 2017).

While BNT identifies these as fundamental needs, it acknowledges that additional needs, such as self-esteem, belonging, control, efficacy, continuity, and distinctiveness, may also contribute to overall well-being (Breakwell, 1988, 1993; Heine et al., 2006). Future investigations will endeavor to enhance the existing literature on the interplay between needs and place attachment.

These subsequent studies will focus on specific needs within distinct contexts, further enriching our understanding of the nuanced relationship between diverse needs and the development of place attachment. More specifically, the present research focused on those needs that, as its antecedents, could enable the development of attachment to the remote workplace. As previously noted, this distinctive setting entails a merging of the home and work domains. In Studies 3a and 4, the attention was directed towards attachment to the workplace exclusively, without explicitly exploring attachment to the home environment in isolation. This approach sets a valuable groundwork for understanding the initial stages of attachment formation to the remote work environment. Future investigations will seek to examine how attachment to the home environment evolves due to the overlap with the work environment.

Finally, it will be important to study the relationships between variables with more in-depth experimental studies. Future studies could use textual or virtual reality scenarios to analyze the effects of various IEQs of the home/remote work environment with experimental procedures.

Even more, a longitudinal modeling approach could help to study place attachment and its evolution. This aspect becomes even more important given the increasing focus on remote working, and future research should analyze the relationship between remote workplace attachment and the length of remote work in the worker's employment history.

Conclusion

In an ever-changing and evolving world of work, the Covid-19 pandemic has significantly accelerated the adoption of hybrid work practices across organizations globally.

Traditional work settings remain relevant, yet an increasing number of employees now find themselves engaged in work activities within spaces that were traditionally designated for domestic and private purposes. This shift has led to functional and, in many instances, spatial transformations in home environments, as individuals allocate part of their living space to accommodate work-related activities and the necessary equipment.

The primary aim of the research was to investigate the dynamics of the evolving relationship and the alignment between individuals and their workplace, examining how the features of these "new" work environments might impact the fulfillment of workers' needs, their sense of emotional attachment to the workplace, and, more broadly, their overall occupational well-being.

By developing a preliminary indicator for assessing the perception of comfort in remote work environments, namely the Perceived Remote Working Environment Quality Indicators (PRWEQIs), it became possible to examine the impact of physical-spatial characteristics on the satisfaction of workers' motivational needs. Grounded in the theoretical framework of Self-Determination Theory, the results highlighted how the features of the remote work environment, contributing to the fulfillment of needs specifically related to the place, underpinned workplace attachment. Consequently, this attachment to the workplace can contribute to the satisfaction of other needs, particularly those of autonomy and competence, which are inherently specific to work activities, thereby enhancing the overall work experience.

Taken together, the research findings not only represent a significant contribution to the study of the antecedents and consequences of place attachment and, more broadly, to the literature on workplace attachment, but, above all, they provide empirical confirmations of the importance of the physical-spatial aspects of work environments, extending these results to the remote work context.

It can be concluded that, while considering other factors such as social support, the decision to introduce hybrid and remote work practices must also take into account the actual environments in which work activities are conducted. Thus, conducting a preliminary analysis of the physical-spatial characteristics that could impact workers' psychological responses is a key point.

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LIST OF APPENDICES

APPENDIX A

Original 20-item of the Perceived Remote Workplace Environment Quality Indicators (PRWEQIs) [ITA] (Study 1).

Pensa ora all'ambiente nel quale svolgi la tua attività di studio da remoto (es. studio, camera da letto). Facciamo riferimento all'ambiente, generalmente domestico, dove è presente la tua postazione e tutti gli strumenti necessari all'attività di studio. Ti verranno poste delle domande riguardanti le dimensioni fisico spaziali della stanza e della postazione. Rispondi indicando il tuo grado di accordo/disaccordo con le seguenti affermazioni utilizzando la seguente scala di risposta:

| | | | | |
|------------------------------|--------------------------------|-----------------------------------|-------------------------------|--------------------------|
| 1 = Totalmente in disaccordo | 2 = Parzialmente in disaccordo | 3 = Né d'accordo né in disaccordo | 4 = Parzialmente in d'accordo | 5 = Totalmente d'accordo |
|------------------------------|--------------------------------|-----------------------------------|-------------------------------|--------------------------|

| | | | | | |
|--|---|---|---|---|---|
| La stanza in cui lavoro è abbastanza silenziosa | 1 | 2 | 3 | 4 | 5 |
| In questa stanza durante il giorno, c'è abbastanza luce naturale | 1 | 2 | 3 | 4 | 5 |
| Posso muovermi liberamente in quella stanza | 1 | 2 | 3 | 4 | 5 |
| Quella stanza è sufficientemente silenziosa | 1 | 2 | 3 | 4 | 5 |
| Quella postazione di lavoro è ben illuminata durante il giorno | 1 | 2 | 3 | 4 | 5 |
| Gli arredi in questa stanza sono in buone condizioni | 1 | 2 | 3 | 4 | 5 |
| In questa stanza, posso muovermi in sicurezza | 1 | 2 | 3 | 4 | 5 |
| In questa postazione di lavoro, ho tutto l'equipaggiamento necessario per l'attività lavorativa in corso | 1 | 2 | 3 | 4 | 5 |
| In quella stanza c'è un sufficiente ricambio d'aria | 1 | 2 | 3 | 4 | 5 |
| Gli arredi in questa stanza sono ben realizzati | 1 | 2 | 3 | 4 | 5 |
| In questa stanza, si possono udire rumori provenienti da altre aree della casa/ambiente (R) | 1 | 2 | 3 | 4 | 5 |
| In questa postazione di lavoro, posso svolgere comodamente la mia attività lavorativa | 1 | 2 | 3 | 4 | 5 |
| In quella stanza posso controllare la temperatura a mio piacimento | 1 | 2 | 3 | 4 | 5 |
| Le superfici degli arredi della postazione di lavoro sono ben fatte e resistenti all'usura | 1 | 2 | 3 | 4 | 5 |
| Sono soddisfatto/a dell'attrezzatura che ho a disposizione in questa postazione di lavoro per la mia attività lavorativa | 1 | 2 | 3 | 4 | 5 |
| In quella stanza posso regolare il livello dell'illuminazione a seconda delle mie necessità | 1 | 2 | 3 | 4 | 5 |
| In questa stanza, posso sentire rumori provenienti dall'esterno (R) | 1 | 2 | 3 | 4 | 5 |
| In quella stanza c'è cattivo odore (R) | 1 | 2 | 3 | 4 | 5 |
| In questa stanza, posso muovermi senza urtare contro nulla | 1 | 2 | 3 | 4 | 5 |
| Sono soddisfatto/a dell'illuminazione in questa stanza | 1 | 2 | 3 | 4 | 5 |

Note. In bold the deleted items. Reverse-scored items are denoted with an (R).

APPENDIX B

Utrecht Work Engagement Scale - Short Version (UWES-9; Schaufeli et al., 2006; Balducci et al., 2010) [ITA] (Study 2 and 4)

Le seguenti affermazioni riguardano le sensazioni e a come potresti esserti sentito/a durante la tua attività lavorativa svolta in Smart Working/da remoto. Rispondi indicando il tuo grado di accordo/disaccordo con le seguenti affermazioni utilizzando la seguente scala di risposta:

| | | | | |
|------------------------------|--------------------------------|-----------------------------------|-------------------------------|--------------------------|
| 1 = Totalmente in disaccordo | 2 = Parzialmente in disaccordo | 3 = Né d'accordo né in disaccordo | 4 = Parzialmente in d'accordo | 5 = Totalmente d'accordo |
|------------------------------|--------------------------------|-----------------------------------|-------------------------------|--------------------------|

| | | | | | |
|--|---|---|---|---|---|
| Quando lavoro da remoto mi sento pieno di energia | 1 | 2 | 3 | 4 | 5 |
| Quando lavoro da remoto, mi sento forte e vigoroso | 1 | 2 | 3 | 4 | 5 |
| La mattina, quando mi alzo, ho voglia di iniziare a lavorare | 1 | 2 | 3 | 4 | 5 |
| Sono entusiasta del mio lavoro | 1 | 2 | 3 | 4 | 5 |
| Il mio lavoro mi ispira | 1 | 2 | 3 | 4 | 5 |
| Sono orgoglioso/a del lavoro che faccio | 1 | 2 | 3 | 4 | 5 |
| Sono felice quando lavoro intensamente | 1 | 2 | 3 | 4 | 5 |
| Mentre lavoro da remoto, sono immerso nel mio lavoro | 1 | 2 | 3 | 4 | 5 |
| Quando lavoro da remoto mi lascio prendere completamente quando lavoro | 1 | 2 | 3 | 4 | 5 |

Perceived Stress Scale – Short Version (PSS-4; Cohen et al., 1983; 1988; Mondo et al., 2022) [ITA] (Study 2)

| | | | | | |
|---|---|---|---|---|---|
| Ho sentito di non essere in grado di avere controllo sulle cose importanti della mia vita (R) | 1 | 2 | 3 | 4 | 5 |
| Mi sono sentito fiducioso/a nelle mie capacità di gestire i miei problemi personali | 1 | 2 | 3 | 4 | 5 |
| Ho sentito che le cose andassero esattamente come dicevo io | 1 | 2 | 3 | 4 | 5 |
| Ho sentito che le difficoltà si stessero accumulando a un punto tale per cui non potevo superarle (R) | 1 | 2 | 3 | 4 | 5 |

Note. Reverse-scored items are denoted with (R).

Remote Job Satisfaction Scale (Lee & Brand, 2005; Toscano & Zappalà, 2020) [ITA] (Study 2)

Ripensa ora alla tua esperienza di lavoro da remoto. Le seguenti affermazioni fanno riferimento alle tue percezioni e valutazioni sulla base di queste esperienze. Rispondi indicando il tuo grado di accordo/disaccordo utilizzando la seguente scala di risposta:

| | | | | |
|---------------------------------|-----------------------------------|--------------------------------------|----------------------------------|-----------------------------|
| 1 = Totalmente in disaccordo | 2 = Parzialmente in disaccordo | 3 = Né d'accordo né in disaccordo | 4 = Parzialmente in d'accordo | 5 = Totalmente d'accordo |
|---------------------------------|-----------------------------------|--------------------------------------|----------------------------------|-----------------------------|

| | | | | | |
|---|---|---|---|---|---|
| Terminata l'emergenza, se dovessi nuovamente decidere se lavorare in Smart Working, lo farei ancora | 1 | 2 | 3 | 4 | 5 |
| Se un amico/a mi chiedesse se sia il caso di lavorare in Smart Working, glielo consiglierei | 1 | 2 | 3 | 4 | 5 |
| In generale, sono soddisfatto/a del mio lavoro in Smart Working | 1 | 2 | 3 | 4 | 5 |

APPENDIX C

Place-related SDT Basic Psychological Need Satisfaction (Ariccio et al., 2021; La Guardia et al., 2000) [ITA] (Study 3a and 3b)

Ripensa ora all'ambiente nel quale svolgi la tua attività lavorativa da remoto. Le seguenti affermazioni fanno riferimento a come ti fa sentire quel luogo e al tipo di interazioni che puoi avere al suo interno. Rispondi indicando il tuo grado di accordo/disaccordo utilizzando la seguente scala di risposta:

| | | | | |
|------------------------------|--------------------------------|-----------------------------------|-------------------------------|--------------------------|
| 1 = Totalmente in disaccordo | 2 = Parzialmente in disaccordo | 3 = Né d'accordo né in disaccordo | 4 = Parzialmente in d'accordo | 5 = Totalmente d'accordo |
|------------------------------|--------------------------------|-----------------------------------|-------------------------------|--------------------------|

| | | | | | |
|---|---|---|---|---|---|
| In questo luogo posso gestire le mie attività in autonomia (dove, quando e come farle) (A) | 1 | 2 | 3 | 4 | 5 |
| Questo luogo mi fa sentire libero di prendere le mie decisioni (Au) | 1 | 2 | 3 | 4 | 5 |
| Questo luogo mi fa sentire responsabile delle mie decisioni (Au) | 1 | 2 | 3 | 4 | 5 |
| Questo luogo mi fa sentire in grado di completare attività sfidanti (Co) | 1 | 2 | 3 | 4 | 5 |
| Questo luogo mi fa sentire in grado di svolgere attività impegnative (Co) | 1 | 2 | 3 | 4 | 5 |
| In questo luogo mi sento fiducioso nelle mie capacità nel poter affrontare le attività che mi mettono alla prova (Co) | 1 | 2 | 3 | 4 | 5 |
| In questo luogo possono condividere un legame con le altre persone (Re) | 1 | 2 | 3 | 4 | 5 |
| In questo luogo mi sento in contatto con le altre persone (Re) | 1 | 2 | 3 | 4 | 5 |
| Questo luogo mi fa sentire emotivamente vicino alle altre persone (Re) | 1 | 2 | 3 | 4 | 5 |

Note. Au: Need for autonomy; Co: Need for competence; Re: Need for relatedness

Remote Workplace Attachment (Jorgensen & Stedman, 2001) [ITA] (Study 3a, 3b and 4)

| | | | | | |
|---|---|---|---|---|---|
| Mi sento rilassato quando sono in questo luogo di lavoro | 1 | 2 | 3 | 4 | 5 |
| Mi sento felice quando sono in questo luogo di lavoro | 1 | 2 | 3 | 4 | 5 |
| Questo luogo di lavoro è il mio posto preferito dove stare | 1 | 2 | 3 | 4 | 5 |
| Quando sono via da tanto tempo, questo luogo di lavoro mi manca molto | 1 | 2 | 3 | 4 | 5 |

APPENDIX D

General instruction [ITA] (Study 3b)

Immagina di esserti appena trasferito/a in una nuova città ed essere stato assunto dall'azienda "WellWork" per il lavoro che hai cercato e sei riuscito ad ottenere. Per contratto, l'azienda WellWork prevede che i propri dipendenti lavorino tre giorni da remoto e due giorni in ufficio. Per questa ragione, ti sei appena trasferito/a in una nuova casa nella quale vivi da solo/a e dove svolgi la tua attività lavorativa durante i tre giorni che, per contratto, trascorri in Smart Working.

Ti verrà ora presentato uno scenario. Ti chiediamo di leggerlo attentamente e cercare di immedesimarti il più possibile nella situazione. Prova a visualizzarne i dettagli e a immaginare di trovarti nella situazione descritta. Prenditi tutto il tempo che ti serve per leggere, immaginare e immagazzinare le informazioni. Dopo che avrai letto lo scenario ti verranno poste alcune domande riguardanti quanto letto.

High comfort condition scenario

Nella tua nuova casa hai a disposizione una stanza da adibire unicamente a postazione di lavoro in remoto, la quale avrà la sola funzione di ufficio. Questa stanza è spaziosa e puoi muoverti liberamente al suo interno senza urtare nulla. La stanza è ben arredata con arredi di qualità e funzionali: in particolare, sull'ampia scrivania in materiali naturali puoi avere a portata di mano tutte le attrezzature necessarie alla tua attività lavorativa. La stanza affaccia su un parco frequentato e nelle ore di punta è silenziosa senza che si sentano rumori provenienti dall'esterno. Dalla finestra filtra la luce naturale che illumina l'interno della stanza e che durante il giorno ti permette di lavorare tenendo spente le luci artificiali. Gli spazi sono ampi e possono essere facilmente gestiti in base alle tue necessità.

Low comfort condition scenario

Nella tua nuova casa hai a disposizione una stanza da adibire a postazione di lavoro in remoto, la quale avrà anche la funzione di camera da letto. Questa stanza è piccola e se ti muovi con cautela puoi evitare di urtare qualsiasi cosa. La stanza è arredata semplicemente con arredi di base e generali: in particolare, sulla piccola scrivania in materiali artificiali puoi tenere a portata di mano solo alcune delle attrezzature necessarie alla tua attività lavorativa. La stanza affaccia su una strada trafficata e nelle ore di punta è rumorosa poiché si sentono rumori provenienti dall'esterno. Dalla finestra i palazzi posti sull'altro lato della strada lasciano in ombra l'interno della stanza ed è meglio lavorare mantenendo accese le luci artificiali. Gli spazi sono ristretti e richiedono attenzione per essere gestiti in base alle tue necessità.

Manipulation check

Ripensa ora a quello che hai letto e all'ambiente che ti è stato presentato. Prenditi un attimo per rielaborare e pensare a quanto è stato descritto. Rispondi indicando il tuo grado di accordo/disaccordo utilizzando la seguente scala di risposta:

| | | | | |
|------------------------------|--------------------------------|-----------------------------------|-------------------------------|--------------------------|
| 1 = Totalmente in disaccordo | 2 = Parzialmente in disaccordo | 3 = Né d'accordo né in disaccordo | 4 = Parzialmente in d'accordo | 5 = Totalmente d'accordo |
|------------------------------|--------------------------------|-----------------------------------|-------------------------------|--------------------------|

| | | | | | |
|---|---|---|---|---|---|
| Questa stanza è un buon ambiente in cui lavorare | 1 | 2 | 3 | 4 | 5 |
| In questa stanza posso muovermi in sicurezza | 1 | 2 | 3 | 4 | 5 |
| In questa stanza posso lavorare in silenzio | 1 | 2 | 3 | 4 | 5 |
| In questa stanza, durante il giorno, posso sfruttare la luce naturale | 1 | 2 | 3 | 4 | 5 |
| Se necessario, posso gestire gli spazi della stanza a mio piacimento | 1 | 2 | 3 | 4 | 5 |

APPENDIX E

Work-Related Basic Psychological Needs Satisfaction and Frustration Scale (Chen et al., 2015; Schultz et al., 2015) [ITA] (Study 4).

Le seguenti domande riguardano i tuoi sentimenti ed emozioni provate durante le ultime 4 settimane e relative alla tua attività di Smart Working. Fai riferimento unicamente a ciò che hai provato durante le giornate in cui hai lavorato da remoto. Rispondi indicando il tuo grado di accordo/disaccordo utilizzando la seguente scala di risposta:

| | | | | |
|------------------------------|--------------------------------|-----------------------------------|-------------------------------|--------------------------|
| 1 = Totalmente in disaccordo | 2 = Parzialmente in disaccordo | 3 = Né d'accordo né in disaccordo | 4 = Parzialmente in d'accordo | 5 = Totalmente d'accordo |
|------------------------------|--------------------------------|-----------------------------------|-------------------------------|--------------------------|

| | | | | | |
|---|---|---|---|---|---|
| Sento un senso di possibilità di scelta e di libertà nelle cose in cui mi impegno (Au) | 1 | 2 | 3 | 4 | 5 |
| Sento che le mie decisioni rispecchiano quello che voglio veramente (Au) | 1 | 2 | 3 | 4 | 5 |
| Sento che le mie scelte sul lavoro esprimono chi sono veramente (Au) | 1 | 2 | 3 | 4 | 5 |
| Sento che sto facendo il lavoro che veramente mi interessa (Au) | 1 | 2 | 3 | 4 | 5 |
| Mi sento fiducioso di poter svolgere il mio lavoro al meglio (Co) | 1 | 2 | 3 | 4 | 5 |
| Mi sento capace in quello che faccio (Co) | 1 | 2 | 3 | 4 | 5 |
| Mi sento competente per raggiungere i miei obiettivi lavorativi (Co) | 1 | 2 | 3 | 4 | 5 |
| Mi sento di poter completare con successo anche i compiti lavorativi più difficili (Co) | 1 | 2 | 3 | 4 | 5 |
| Sento che i colleghi a cui tengo, tengono a me (Re) | 1 | 2 | 3 | 4 | 5 |
| Mi sento legato/a ai colleghi che mi supportano e ai quali tengo (Re) | 1 | 2 | 3 | 4 | 5 |
| Mi sento vicino e in relazione continua con i colleghi a cui tengo (Re) | 1 | 2 | 3 | 4 | 5 |
| Riesco a provare un sentimento di calore nei confronti dei miei colleghi (Re) | 1 | 2 | 3 | 4 | 5 |

Note. Au: Need for autonomy; Co: Need for competence; Re: Need for relatedness